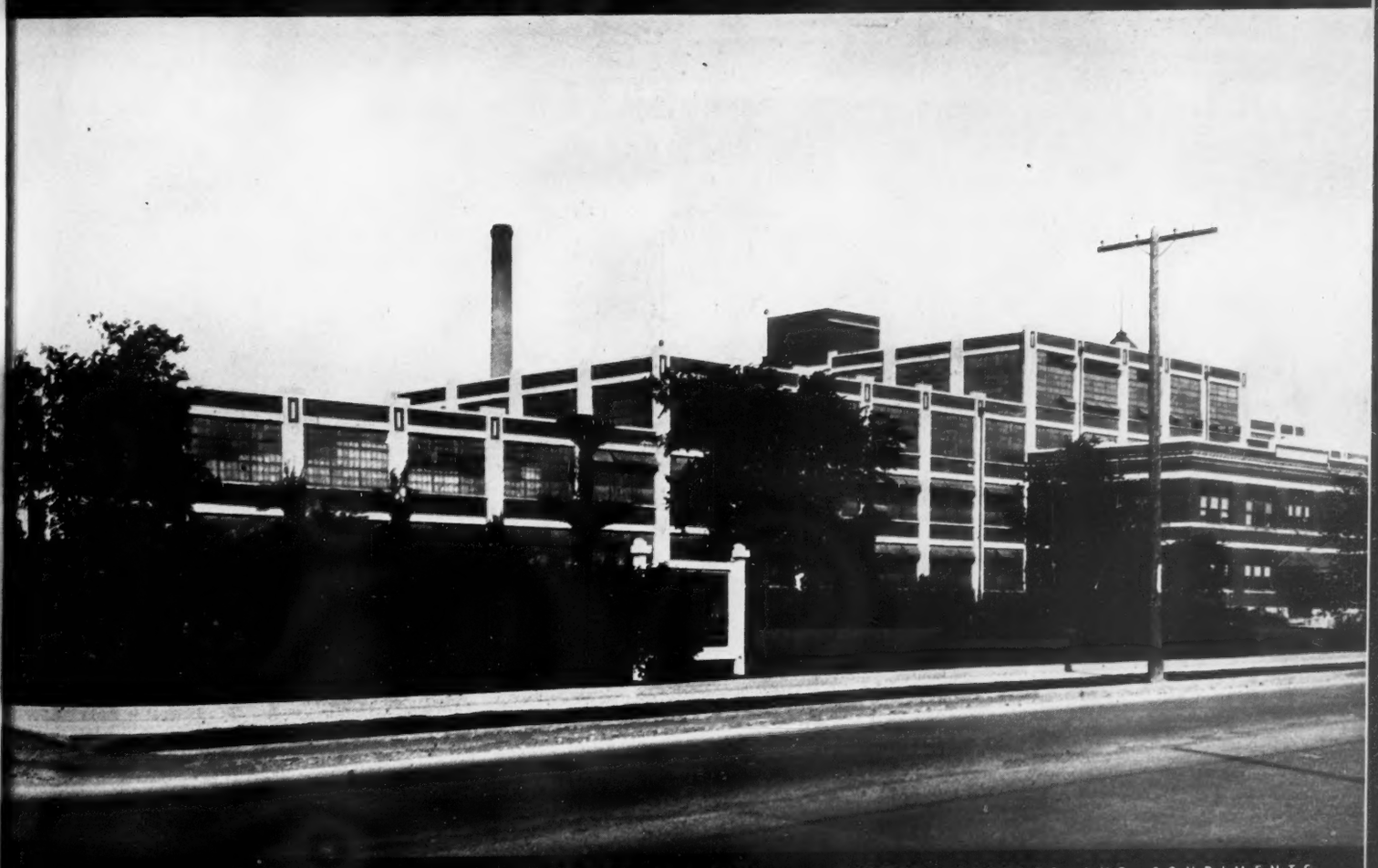
FOOD INDUSTRIES

APRIL 1938



HOMES OF FAMOUS FOODS . . . LIBBY'S PICKLES AND CONDIMENTS

FROZEN FOODS DIRECTORY NUMBER

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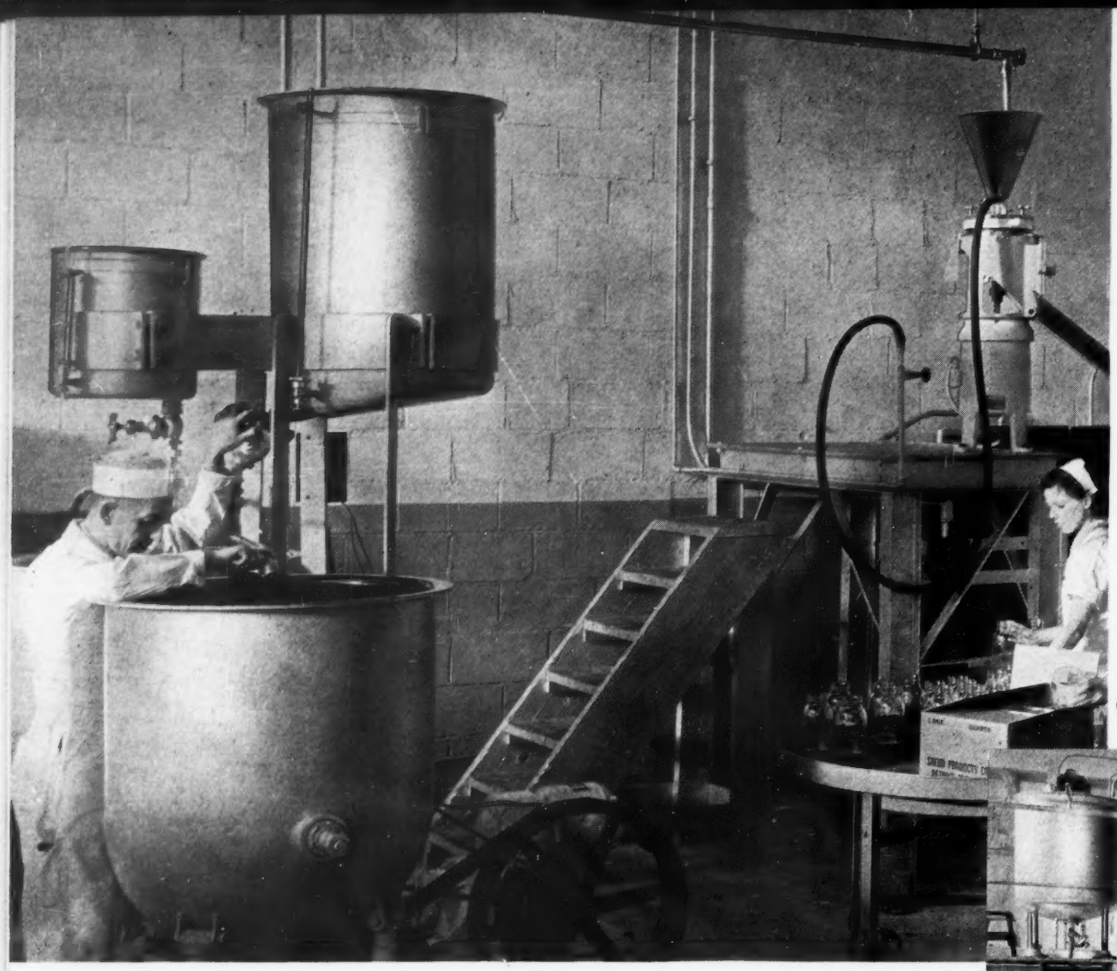

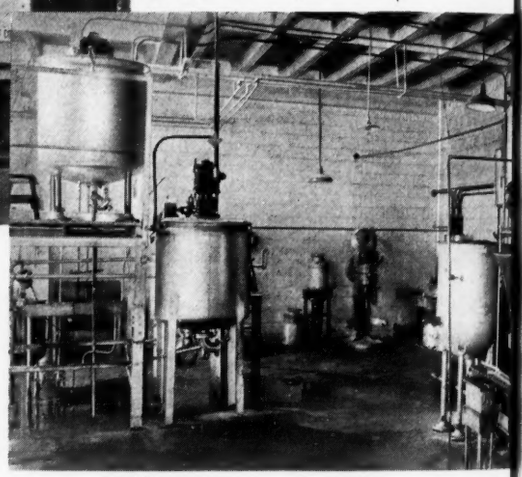

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Vice-President and Manager

E. S. STATELER, *Associate Editor*, Chicago
G. L. MONTGOMERY, *Managing Editor*
IVAN C. MILLER, *Distribution Editor*
F. K. LAWLER, *Assistant Editor*

R. S. McBRIDE, Washington, D. C.
PAUL WOOTON, Washington, D. C.
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S. T. HENRY, Spruce Pine, N. C.

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★ *Homes of Famous Foods*

Inaugurating a series of cover illustrations showing homes of famous foods, this month's cover presents Libby, McNeill & Libby, Blue Island, Illinois. This is the home of Libby's pickles and condiments. Though Libby's line includes also meats, fish, fruits, vegetables and sauerkraut, from this plant comes most of its pickles, olives, catsup, mustard, relishes, tomato juice, pork and beans, jellies and baby foods.

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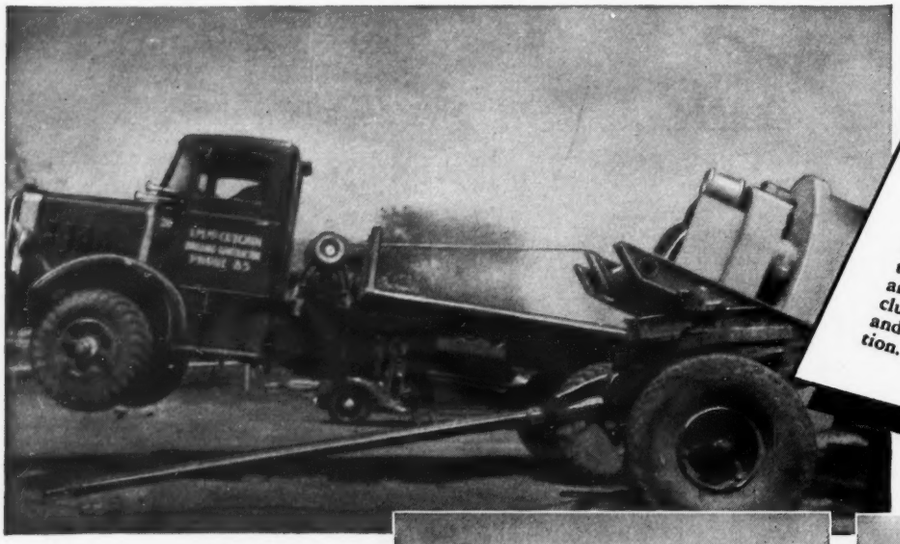
HERE'S THE WAY McCUTCHIN LOADS 'EM



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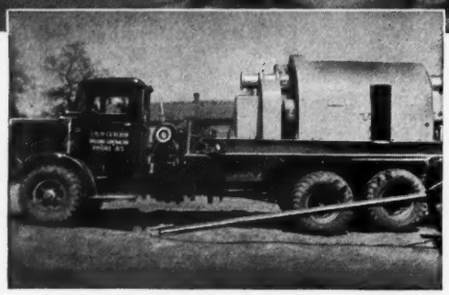

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FOOD INDUSTRIES

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Established 1928—McGraw-Hill Publishing Company, Inc.

Vol. 10, No. 4

Laurence V. Burton, Editor

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APRIL 1938

The Talk of the Industry

» SOMETHING UNUSUAL occurred during February. It was possible to purchase strawberries at reasonable prices and of perfect quality at retail stores in the North. Evidently Southern growers and shippers are learning a few tricks.

» HELP! HELP!! A stranger from the Southwest—in fact, the far Southwest—has written to ask us for plans for a store that is "something out of the ordinary," something that "would draw in the people by its novelty or style. It should not be an expensive plan nor a very elaborate one—one suitable for a town of one to three hundred."

Who will volunteer the proper answer? Also, by any chance have any of our subscribers from Camden, N. J., been vacationing recently in that part of the country?

» ACCORDING TO A STORY in *Nature*, a highbrow British periodical, from which we occasionally "digest" an important scientific statement, the Russians are at it again. This time the

plan is to feed thallium to sheep to make them shed their wool by a process something like moulting.

If the Russians should then eat the sheep, it is our surmise that there is considerable probability that all the comrades will lose their hair and become a hairless, whiskerless race.

» ALL THE HOT AIR being spilled in our village, otherwise known as New York, in an effort to make a 16-oz. loaf of white bread retail for 9 cents sounds like so much piffle. It would be mildly amusing were it not a symptom of a social malady that could easily spread to other cities and arouse unwarranted ill-feeling.

About the only real good that can come of this jousting with windmills is that the investigators may—we hope—become thoroughly acquainted with the costs of manufacturing and doing business.

In New York, the Bureau of Markets has succeeded in getting a peek at the cost books of one large bakery and has found everything accounted for but 1/10 of 1 cent per loaf—which represents the profit.

» THE GOVERNMENT'S first attempt at price-fixing of bituminous coal has flopped. So many injunctions were issued to restrain the Bituminous Coal Commission from enforcing its price-decrees that the boys decided to withdraw the 30,000 price minimums and start all over again.

There must be a floor under coal prices, but a ceiling over bread prices.

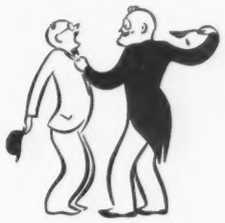
Price fixing is all right if you have Mr. John L. Lewis on your side.

» FOR YEARS the emblem of Socialism has been the hammer and sickle, symbolic of the common interest of urban labor and farmers. But, judging by the recent attitude of farmers near San Diego, Calif., they are changing their minds about this mutuality of interest. When labor organizers threatened a strike in San Diego dairies, if a contract were not immediately signed with the union, the farmers acted. They organized 80 per cent of the producers in one day, threatened to shut off the milk supply if the contract was signed.

It was not signed.

Farmers are bad actors when aroused, especially dairy farmers.

» IN ONLY TWO WAYS is it possible for government really to affect business volume. One is by taxation, the other by monetary policy. This country has been lately treated to both forms of influence. And now, it is anticipated,



we are to be treated to the antidote. Apparently we are to be given a teaspoonful of inflationary medicine, just to up prices a wee bit.

A year ago the farm price index was at 91. Today it is about 70. Certain very astute cynics have asserted that the present business situation was brought about intentionally by the Administration so that the agricultural control bill could be passed. For low prices were essential in order that the country would accept it.

The medicine acts very slowly, taking more than six months to show noticeable results. Just a hundred million guinea pigs, that's all.

» THERE BE FEW GUSTATORY DELIGHTS better than good Philadelphia scrapple, but never can it be purchased away

from the City of Brotherly Love in satisfactory form. To be sure, it is sometimes available in nearby towns, but always it is either lacking in peppery zest or else it is moldy when purchased away from its native heath. Up to now the only way to get it good is to buy it in Philadelphia and take it home—wherever you live.

But not every maker of this food possesses the requisite skill in its blending of flavors, and there seems to be a direct correlation between its tendency to mold and its appetite appeal. In general, the better the flavor the easier it spoils: or conversely, the poorer the flavor the longer it keeps. Which leads to the suggestion that maybe the trouble is the result of contaminated pepper. Some recent examinations of pepper indicate that this spice is often so heavily laden with microbic population that it is easy to guess why good scrapple does not keep more than a pitifully few days.

Who is the enterprising genius who will make a good Philadelphia scrapple with sterilized spices and satisfy a craving market?

You Don't Pay Wages Out of Taxes

MR. A. W. ROBERTSON, chairman of Westinghouse, recently made a very penetrating comment to a Senatorial committee. He said, "You can't pay wages out of the money you pay for taxes." That observation ought to be given the widest publicity. Every voter ought to repeat it every day. Every relief check ought to convey the same message.

Everyone who pays income taxes has been thinking parallel thoughts when he has filled out the tax form and has thought of all the things he would like to buy (and thereby create employment) with the money he now must pay to state and federal governments (to relieve unemployment and thereby create more unemployment). And the same thing applies to corporations even more than to individuals.

Any thinking man realizes that a substantial part of the cost of government is justifiable: national defense, lighthouses, post offices, public health, currency and the like, where there is a tangible return for the money paid out. But the objection comes when a person (or a corporation) has to save to pay taxes to help maintain those who might be working if he could spend his money for the things he wants.

Hope for Tax Bill Revision

SINCE EACH of the sharply conflicting economic viewpoints now in the forefront in Washington agrees on one detail—that expenditures for new machinery and plant should not be penalized by the undistributed earnings tax—it seems a fair bet that food processors, in company with other manufacturers, may figure on renovation and expansion out of any earnings which may be available during 1938 without fear of this tax. This is important because entirely too much attention has been paid to the House tax bill. The Senate will do a rather complete job of rewriting that, and the House membership will not only fail to get excited over the changes, but will secretly applaud them.

As a matter of fact, since the White House pressure was put on, to get the tax bill "started right," the President has almost visibly weakened in his stubborn insistence on the maintenance of his favorite brainchild.

Especially since nearly every one of his supporters who happens, in addition to being a New Dealer, to have any influence on Capitol Hill, is on the other side. For instance there is Bernard M. Baruch, who thinks modification of New Deal policies is necessary to encourage business, and insists this is far more important than anything the government can do. For instance, Marriner S. Eccles, who believes implicitly in the principle of NOT letting corporations save for a rainy day, but would exempt expenditures for new plant and equipment.

Roosevelt, biding his time, will make another fight, probably next year. To permit spending for new plant means increasing productive capacity, and Roosevelt believes government, and not the individual corporation, should determine when that is necessary. But for the present he must bow to the storm.

Hors d'Oeuvres

• *If a man misses his meals one day he will lie; if he misses them two days he will steal; three days, he will kill. This is the observation on the effects of starvation in primitive lands. Civilized man must be more sensitive to hunger, for he has been known to lie between meals.*

• Here's a new name for your wine and liquor lists—Lubrication Charts. They have them at every filling station.

• *It has been suggested to epicures that they use food to punish their enemies, as well as to delight their friends. For instance, have your dearest competitor out for a week-end. Then get him off to a good start by serving on Saturday morning a breakfast consisting of delicious, hot, flaky, home-baked biscuits and a clover-blossom-honey jar filled with sparkling, translucent, strained castor oil.*

• Baseball or baking, it takes men. So said Rogers Hornsby in an address at the convention of bakery engineers. But don't all you bakers get to feeling cocky. Maybe you're only in a class with the Brooklyn Dodgers.

• *Eighty per cent of the vitamin C in Northern Spy apples is lost in baking apple pie, scientists have reported. Wouldn't that just ruin your appetite for mother's home-made apple pie!*

• Salesmen over 40 are preferable to younger men, says an executive of one of the largest food companies. Younger men are discouraged too easily and are not able to "take it," is the contention. That is to say, they haven't developed a sufficiently thick crust.

• *Almost six billion lollipops are consumed in America annually. Even Barnum was too conservative in estimating the number of suckers.*

• What is the most important food fish in the world. You're wrong. It's the herring. Yet this fish probably has more natural enemies than any other. It is preyed upon by cod, pollock, haddock, silver hake, mackerel and sharks. Finback whales devour it in great quantities and the squid destroys large numbers of the young. Moreover, the herring is subject to wholesale destruction by stranding on beaches during storms. There ought to be a moral in this.

• *'Tis muchly illegal to print poker hands on the reverse side of beer bottle labels. So rules the august Michigan State Liquor Commission. This puts an end to the labels used by Pfeiffer Brewing Co., Detroit. These labels enabled the boys having one at Jake's to pass the check to holder of the low hand. But that was gambling! How terrifically terrible!*

• Food engineering is making rapid headway. For example, there is the development of the Roto-Cut which grinds 450 lb. of sausage in 30 seconds. Pretty soon a packer will drive three hogs and a cow into one side of a machine and a ton of hamburger will come out the other.

• *Alack! A little lass! There's dirty work at the intersection. The knaves are taking the horse out of horseradish. They are substituting for the genuine root, which sells at 20 cents a pound, the lowly turnip, at 1 cent. Some are using a mixture of turnip, parsnip and starch, and adding a biting chemical like mustard oil. 'Twill ruin the business, this chicanery. The public knows good horseradish when it bites them.*

No Processing Taxes Yet

THE "Agricultural Adjustment Act of 1938" is now the law of the land. The Act amends the Soil Conservation and Domestic Allotment Act, the Federal Surplus Commodities Corporation Act. as well as introduces a huge amount of new law. As finally printed, it is 52 pages long. Cotton, wheat, corn, tobacco and rice are the only commodities mentioned for regulation. Food manufacturers are only indirectly affected.

No processing taxes have been imposed—yet. These will come along later in a separate law. When that time comes, prudence dictates that every one concerned should bill, or require that he be billed, for the processing taxes as a separate item on every invoice.

S. 5 Grows More Drastic

ANOTHER REVISION of the proposed Food and Drug Law, S.5, has been prepared by the House subcommittee. This includes most of the old bill with the important addition of a drug licensing section. Food manufacturers may not think that they are interested in this proposed drug feature, but they are. It is the nose of the regulatory camel poking into the industries' tent. And it is a big camel, too!

The proposal is that anyone who wishes to bring out a new drug must get a license from the Secretary of Agriculture before he can place such new product in interstate commerce. The sulfanilimide elixir case constitutes, of course, the basis for this proposal.

This is an excellent way to prevent progress in medicine. Though the Department will deny it, this is the way it would work. The research laboratory would bring out a new product. Animal tests and carefully controlled hospital investigations would be made at the point of development. Then, discreet careful offerings elsewhere would be desired, but prevented by the law until license had been taken out. The Department would be afraid to license anything at that early stage. They would have to accept a share in the responsibility if they granted a license. Quite naturally they would be timid.

Food manufacturers are concerned with this: if drugs must be regulated, then why not many of the foods which, it will be argued, may be just as dangerous to the public as a new drug. New solvents for recovering essential oils, flavors, or extracts will be under suspicion. New compounded foods will be required to prove their case before the Department. Anything relating to dietetic claims or modifications of the conventional may soon find itself making obeisance to the board of official review.

There are other better ways in which to proceed than this. The Department has plenty of authority to do needed things. What is required is the somewhat larger appropriation to provide a first-class cooperating staff of field inspectors inspired with the spirit of active participation in the survey of new developments. Industry will cooperate, as it always has; and the Department *with industry* can do a good job under the present Act.

Production Department Will Solve This Sales Problem

A VERY SIGNIFICANT EXAMPLE of the inter-relationship of selling problems and production problems is found in the troubles of the cling peach canners in California. Their efforts to solve their problems caused by overproduction, described in FOOD INDUSTRIES, March, 1938, page 145, are to be regarded only as emergency measures, temporary in nature. Any permanent solution must rest on surer supports than price maintenance agreements.

Perhaps the example of those who pack the softer, more flavorsome varieties of peaches—notably the freestone varieties—points the way to a permanent solution. Apparently those who have disregarded the eye appeal of the usual packs of cling-stone peaches and have embraced the appetite appeal of the other varieties are going to town. All reports on the latter indicate that here is a marked public preference for flavor over looks.

It appears that only the production department will be able to effect a permanent solution of this sales problem. Either procuring new varieties or utilizing better technology to adapt the product to public demand will be the answer.

Avoiding the Claim Racket

ONE MORE EXAMPLE of the food manufacturers' interest in clean politics is found in the damage claim racket—or, call it consumer complaints where only the payment of a sum of money will soothe the claimant. Manufacturers who are interested should read the Annual Report of the Secretary of the National Canners Association for 1938. There it is related how the Accident Fraud Investigation made by the District Attorney of a county having a huge population resulted in a 33-per cent decrease in the number of new claims. Also, that ten attorneys have resigned from the bar and official complaints have been lodged against 116 other lawyers, as well as 34 physicians as a direct result of the activities of the D. A.

So much for law and order. It has a tangible value to the manufacturer of foods from this one angle.

Nevertheless there is an obligation on the part of manufacturers to pay justifiable and meritorious claims. There ought never be any causes for claims, but accidents and mishaps do occur. Shabby treatment of meritorious claims is only an invitation to public hostility, prejudiced juries, and bigger awards.

Penalty of Labor's Unsound Policies

SPEAKING OF ORGANIZED LABOR, one cannot help but be sympathetic as well as critical of their policies, and demands. One is critical because there never was a body of men who have been following worse or more unsound economic advice than organized labor. And one is sympathetic with the rank and file for their hopes and aspirations which must inevitably be dejected when they realize how utterly rotten is the economic policy of their own paid leaders.

Recent wage increase wrung from the railroads by some of the brotherhoods has forced curtailment of expenditures for wages of other who are less powerful. Unsound or greedy labor leadership is a harmful force, much more harmful than unsound or greedy management. Unsound management may go broke or a receiver may be appointed to continue the business. At worst, jobs may be temporarily lost. Greedy management, on the other hand, is usually smart enough to keep the business going. The jobs remain, though the pay may be low. But greedy or unsound labor leadership often forces management into an untenable situation from which there is no out but the complete elimination of a lot of jobs.

Shortsighted labor demands often impose upon management selling problems with which it is unable to cope. Management cannot always pass along the increased costs. Hence, unless labor can develop managers with sufficient ability to operate business successfully under the conditions labor would impose, *labor would be wise in not demanding more of management than the stockholders demand.*

Sometimes stockholders have to do without dividends for many years at a time.

What's Ahead in INDUSTRIAL

A YEAR AGO the question was: "Will labor relations be as interesting a subject in 1938 as in February, 1937?" From observation of the newspapers, it is apparent that no subject has been of as much current public interest in the past six months as industrial relations.

Here is a field of endeavor that has evolved through the welfare, the educational, the ballyhoo, the research, the scientific, and the management function phases, with recent emphasis on compulsion. The status of the personnel job has changed in the course of time from payroll clerk, safety man, employment man, personnel director, up to vice-president in charge of industrial relations.

A year ago it was concluded that the efforts exerted to solve our social problems were in direct proportion to the intensity of economic pressure. Emphasis upon the legislative and collective bargaining approach to industrial relations seemed to have been a direct consequence of the indifference of employers to the human aspect of business enterprises. Industrial relations was recognized as a national problem, and organizations devoted to the subject urged that its importance as a major function of general management should be more widely recognized.

Now it is observed that a national law "to diminish the causes of labor disputes" has been in effect for two and a half years. Contracts and agreements designed to improve labor relations are piled high in the archives. Yet industrial strife during the past year has swept the country like a plague. The number of strikes in the first six months of 1937 exceeded the total of the previous year. Newspaper headlines have portrayed the picture with dramatic emphasis. They have taken us through a full cycle in the ebb and flow of labor conquests: the most costly maritime strikes in American history, the auto-strike, the steel strike, the sit-in strike, the lie-down strike, the right-to-work issue, curbs on picketing, expansion of the labor movement, bloodshed, vigilantes, collapse of organized labor peace drives, lay-offs, wage cuts, and condemnation of the Wagner act.

Based on an address before the Conference of the Personnel Division of the American Management Association (of which Mr. Spates is a vice-president), Chicago, Feb. 15, 1938.

Some aspects of the shifting scene may be summarized as follows: A year ago the wave of sit-down strikes had reached its peak and there was reason to believe that this form of industrial conflict, which had already crippled production in the automobile industry, might spread to other industries as well. Today it is clear that most organized labor leaders regard the sit-down strike as a liability rather than an asset. One strike last November ended directly on the initiative of officials of the CIO, who insisted not only that a local union leave the property which it had occupied, but that it respect the validity of a written contract.

A year ago the Federal Government had taken no position regarding the sit-down strike, except for the remark of a cabinet member that its legality "had not yet been determined." Today the Federal Government is on record, through a formal statement of the same official, as believing that "strikers may not lawfully use the sit-down method" and that the method itself is "full of hazards to the progressive, democratic development of trade unionism, and the orderly process of collective bargaining."

Preparations were under way a year ago for a nation-wide strike in the steel industry. Later developments in connection with that strike indicated that, while public opinion is not opposed to the growth of trade unionism and to the extension of collective bargaining, it is opposed to the use of force to accomplish ends, and that it is prepared to ask officials to protect the right to work as well as the right to strike.

A YEAR AGO the President had submitted to the Congress a report which gave promise of the enactment of wage-and-hour legislation which might have a seriously disrupting effect on industry and employment. It is now clear that if any legislation at all is enacted in this field, it will be more practical and flexible than the plan originally proposed.

A year ago, trade unionism was increasing by leaps and bounds, and some thought it would sweep the country like wild-fire. Today trade unionism is still, as it has always been in the United States where employees are free to choose, a fluctuating and minority movement.

The fundamental characteristics of this problem of industrial peace are exemplified by the analysis of the maritime situation made by Lieutenant J. S. Stapler in the May, 1937, Proceedings of the United States Naval Institute. Lieutenant Stapler blamed both government and steamship companies for many of the negative conditions afloat. He pointed out that operators have frequently pursued niggardly personnel policies—or, none at all; that living conditions and food have been bad; that the government had provided no far-sighted system of recruiting and training; that its inspection and supervision systems had, until recently, been neglected, and are still susceptible of considerable improvement.

But, according to Lieutenant Stapler, the blame is not alone the government's nor the operator's. A parallel to some of the negative conditions afloat can be found in some of the conditions ashore. Some of the labor organizations at sea, like some of the labor organizations ashore, show a lack of enlightened leadership, and are apparently too much the instruments of agitators or of men filled with lust for personal power.

The mutuality of responsibility for labor strife, portrayed in this analysis, is a common pattern in American industry. Too many employers are still rendering lip service to the principle of collective bargaining which has been established as the law of the land in every sense of the word and is not likely to be abridged for many years to come, if at all. Labor organizers, not satisfied to leave employees free to exercise their rights under the Wagner act, resort to coercive methods to sell their services.

Any imperfections in the Wagner act will no doubt be changed by amendment. However, some things are more important than amendments to the Wagner labor act. The maximum possible amendments are far less important to the ultimate well-being of the American workman than a change in the economic philosophy of spokesmen for organized labor. So long as organized labor maintains its traditional philosophy of shorter hours and higher wages, not justified by increased efficiency of production, the paramount problem of unemployment will remain unsolved. Labor leaders

RELATIONS

Photo by Ben Pinchot

By THOMAS G. SPATES

Director of Industrial Relations, General Foods Corporation, New York

should realize that there is only one way of increasing the national income and employment, and that is by instigating a larger production of goods and services.

At this point it is well for us to take stock of what lies ahead. As I see it, there are three possible views, the short view, the long view, and what I regard as the fundamental view. In the short view, as recently published by one writer on the subject, we have:

1. Wages will probably remain at their present levels during the first half of 1938, at least, as contrasted with the first half of 1937, when they were in a state of flux.
2. The CIO and the AF of L will reconcile their differences and merge during 1938—with organized labor thus presenting a united front despite the breaking off of recent negotiations.
3. In 1938, there will be a period for consolidation of gain, appraisal, re-orientation on the part of organized labor, the major problem being to hold present membership rather than to increase it.
4. Expiring labor agreements on the whole will be renewed substantially in their present form, so far as wages and hours are concerned, but with more thought given to the responsibility of the parties involved.
5. Demands for wage increases will be fewer and the cost of living fluctuating but little from its present level, at least through the first half of 1938.
6. Industrial disputes will be fewer than in 1937.
7. Unemployment will increase during the first quarter of 1938.

In the long view we see:

1. That there will be continued reductions of the gap between office and factory employees in the matter of personnel policy. As these differences in policy between office and factory personnel policy become less and less, the results may lead to unionization of office employees.
2. There will be a tendency for workers to assume increasingly an attitude of having a vested interest in their jobs. Growing out of this will come an end to paternalism. Paternalism as an approach to sound industrial relations, is out.
3. There will be an increased appreciation of the democratic principle in business administration. This does not necessarily mean unionism; it might equally well mean consultative supervision or employee representation.
4. There will be an increasingly wide application of the technique of personnel administration as a major function of general management.
5. There will be public condemnation and restriction of the improper use of economic power by any group.
6. Unless the two existing national labor organizations combine, and adopt the technique of cooperation rather than of conflict, then there is the possibility of a third national labor movement.

Just as employers have to reconstruct their philosophy in industrial relations, so do labor leaders have to reconstruct their philosophy from that of conflict and battle to that of cooperation and friendliness.

It might be observed that there is unanimous agreement on the part of government officials, social workers, labor leaders, employers, and employees that the objective is social justice or industrial peace. On this point there is no disagreement. However, there are a variety of methods of attaining a universally desired objective. If we exclude paternalism and beneficient autocracy we will, I believe, find that all of the policies and practices which have been proposed or applied, having as their objective social justice or industrial peace, may be classified under three general headings: (1) Legislation; (2) Traditional trade unionism; (3) The technique of personnel administration. These are, however, not mutually exclusive and, in fact, may be complementary.

BY THE TECHNIQUE of personnel administration, I mean those policies and methods of administering an organization which have been found by practical experience to enhance the value of the individual to himself and society, to encourage and perpetuate spontaneous cooperation, and to create and maintain a spirit of friendliness throughout the work relationship.

Before determining the place of personnel administration in management, we might remind ourselves that the generally accepted and almost universal functions of management—whether in industry, commerce or government—are finance, purchasing, production, marketing, research, public relations, and personnel relations.

The first place for personnel administration is in the mind and heart of the chief executive of that organization. Unless he is determined that the best possible job on personnel administration must be done in his organization, then other steps are fraught with futility.

The second place for personnel administration is in the hands of a competent specialist who serves the chief executive in a staff and advisory capacity, aiding the line organization in the development and execution of sound policies. The full-time specialist is essential because, human nature being what it is, the operating executive cannot be depended upon voluntarily to maintain high standards of personnel relations. By the nature of things, he is harassed by material problems, and procrastinates with respect to human problems.

The third place for personnel administration is in a statement of general management policy reduced to writing, that makes clear to everyone in the organization the principles and objectives for which the management stands, and the means whereby they are to be made effective.

Whether or not we are to have more or less of legislation, whether or not we are to have more or less of traditional trade unionism, experience shows that in the final analysis, *we must rely primarily for the attainment of social justice or industrial peace upon the technique of personnel administration.*

You cannot legislate or contract out the spirit of friendliness throughout the works relationship which must prevail if human happiness in the daily task is to be assured. Furthermore, only good personnel administration will eliminate the subtle abuses that are the true causes of human friction in industry, commerce and government.

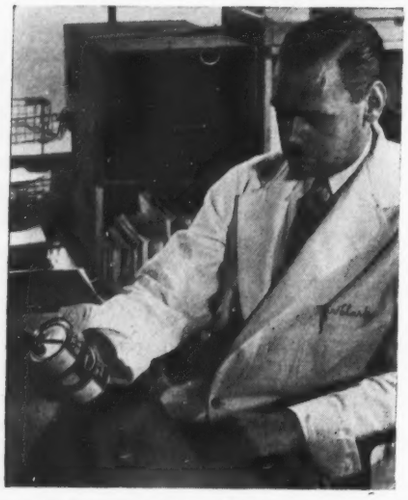
In the Feb. 5 number of *Collier's*

(*Turn to page* 225)

What 232 YEARS Have Taught Us About QUALITY CONTROL

By B. W. CLARKE

Chief Chemist—The Crosse & Blackwell Co.
Baltimore, Md.



The author, B. W. Clarke, inspects the label on a recently introduced product of The Crosse & Blackwell Co.

QUALITY CONTROL, for a company manufacturing a diversified line of high quality food products for the grocery trade, involves many interesting technological problems and necessitates continual alertness, careful organization and minute attention to detail for all those engaged in production. A range of food products comprising some 25 varieties of preserves, jellies and marmalades; fifteen varieties of soups; tomato products such as tomato juice, catsup, chili sauce and pulp; various canned meat specialties; pickles; sauces; relishes and condiments; fish and meat pastes; and sundry other items, utilizes a tremendous number of raw materials and many manufacturing processes, which must be subjected to constant control and careful supervision if uniform products of high quality are to result.

Every product presents its own particular problems but certain fundamental considerations are common to all. First, we must clearly understand what we mean by quality control; that is, how do we define quality and how can we control it. In the manufacture of food products which are consumed primarily by reason of their appeal to the appetite, the most important qualities are those which render any particular product appetizing, which are flavor, appearance and texture. Of these, flavor is probably the most important as a consumer may be attracted to a product the first time by its appearance but will not be a steady purchaser unless the flavor satisfies.

It is true that for each product there are certain chemical and physical requirements, to which it must conform to ensure adequate keeping properties and compliances with federal or state standards where these exist; these requirements will also be of assistance in maintaining uniformity. However, such requirements will not determine the quality of the product from the point of view of this discussion. For example, a preserve may be made with the correct proportion of 45 lb. of fruit to 55 lb. of sugar, and it may be concentrated to the specified 68 per cent of soluble solids and have a very nice consistency, but it will be of little value to the consumer or to the sales department if it looks and tastes like shoe polish.

Unfortunately, there are very few chemical or physical tests sufficiently reliable or rapid in application to be of much value in estimating the factors of flavor and appearance which are of paramount importance. For determining these factors we must rely upon organoleptic tests or other tests depending on our senses of taste, sight, smell and feel to measure the quality of any particular product. It is well known that these senses are developed to a different extent in every individual. But it is surprising how well, by careful training, combined with experience, the senses of taste and smell can be developed so that those individuals responsible for this production of any particular product can recognize the qualities of flavor, aroma and appearance which are considered desirable in that product. One of the cardinal principles of quality control, therefore, as we see it, is to train those responsible for the production of any product to appreciate the qualities which the consumer desires in that particular product.

The first problem is to decide what qualities are desired and can be attained. This in itself is a major undertaking and should include surveys of possible raw materials and manufacturing processes, a critical examination of competitive products, a study of consumer's preferences and finally the establishment of a standard by a technical committee. Furthermore, the development department is continually studying each product with the object of attaining a higher standard if possible and frequently as the result of this work it is possible to introduce higher standards.

▶Quality control embodies more than rigid adherence to chemical specifications and sanitation. It demands control of flavor, appearance and texture. It begins with the raw material and carries through to the time when the packaged food is opened by the consumer. How one concern, of world-wide reputation, maintains such control, is of interest to

All Food Manufacturers

Mold counts and other microscopic tests are mainstays of quality control, being particularly useful to packers of tomato products, such as The Crosse & Blackwell Co.

Another very important point is the appreciation of the changes which take place during storage after manufacture. Anyone familiar with the production of canned or bottled products knows that changes take place during storage, for example, absorption of sauce by beans or spaghetti, blending of flavor in soups, brightening of color in meat products, changes in flavor of tomato juice, changes of consistency in tomato catsup. The standard at the time of manufacture must therefore be set with these changes in mind and of course cannot be intelligently established unless a study of them has been made. It is the quality of the product when it reaches the consumer and not the quality at the time of manufacture which ultimately determines the appeal of any product and the importance of recognizing this factor cannot be overemphasized. An estimate of the average shelf life of the product is evidently of value in this connection.

When the standard for any particular product has been set, the production staff is trained to recognize this standard and the methods by which it is to be produced. It is necessary to over-ride individual preferences, particularly of taste (even the preferences of the higher executives), as it may happen that the standard aimed at may not be the standard which would be set by any particular member of the staff. Individual tastes must be trained to recognize the flavor which has been decided on as desirable.

It is not sufficient merely to know the qualities which we desire to attain, but we also must know how to attain them and how to avoid attaining undesirable qualities. This latter point is of tremendous importance. A system to control the quality of thousands of packages produced in the course of one operating day, must be a system which will, as far as possible, ensure the quality desired in the packages, not a system which merely tells us, when it is too late to do anything about it, whether the finished packages are of the desired quality or not. Furthermore, when the manufactured products that go into the packages are prepared at relatively high temperatures and suffer serious loss of quality if held long in that condition, it is obviously not good practice to carry out complicated tests before packaging any particular batch. It is, therefore, essential to organize the manufacturing processes, and to train those responsible for production, so that the desired quality will normally be produced, and to organize the system of control and inspection so that any variations are detected and adjusted immediately.

To achieve this condition, the first step is a thorough understanding of the raw materials which enter into the products and of the changes the materials may undergo during the manufacturing processes. When the raw materials are largely natural products such as vegetables, fruits, meat and the like, we are confronted with the twin problems of quality and uniformity. We must first of all determine what are the properties we desire in our raw materials and we must then determine how to treat these materials to retain the desirable properties. It is frequently necessary constantly to adjust formulas (except where these are regulated by Federal or State standards) or processes to allow for variations in the quality of raw materials received. The selection and inspection of raw materials is, therefore, one of the most important steps in attaining the control of quality.

With many raw materials, chemical and physical tests can be applied which are of value in checking quality and uniformity, such as polarizing value, ash and clarity in solution of sugar, acidity of vinegar, acidity and salt content of pickles percentage of sulphates and insoluble materials in salt, and acidity of dairy products.

Nevertheless, properties of flavor, texture and color are of over-riding importance in most raw materials and form the basis of selection, provided of course, they comply with the necessary chemical and physical characteristics. With many fruits and vegetables which are bought on a contract basis or on the open market it is not always possible to obtain supplies having the characteristics desired. Much can be done by buying on grade but there is always a variation in quality due to crop conditions which must be determined and allowed for. This brings us once again to the problem of training and organizing production personnel from the viewpoint of quality control so that they can recognize the variations in raw materials which will produce differences in the finished product, and also appreciate the effect which variations in handling procedure or manufacturing processes will produce. Thus everyone engaged in production must realize the importance of speed in handling perishable raw materials and know the undesirable effects of excessive delay; the undesirable changes in flavor and consistency produced by exposure to air, particularly with trimmed or bruised fruit and vegetable surfaces; the importance of prompt and thorough cooling; and the harmful effects of contaminating metals, particularly small amounts of copper and iron.

Thorough cleaning of all equipment is another aspect of this phase of quality control—all pipe lines and pumps must be thoroughly cleaned after each day of operation, as insufficient cleaning, apart from the more obvious risk of producing spoilage, is always likely to produce undesirable changes in flavor and appearance in the next run made in that equipment. Incidentally, this necessity for thorough cleaning must be borne

in mind in selecting and installing new equipment or machinery, both from the point of view of materials used and design of equipment.

In our organization, the laboratory staff is naturally the nucleus of the quality control organization. For each product, starting with raw materials and continuing through the manufacturing processes, the laboratory is responsible for carrying out tests and inspections which will insure the desired quality in the finished product. The testing and inspection must be organized so that changes in quality can be detected promptly and changes in materials or procedure made immediately where necessary. No materials for manufacturing purposes are used until released by the laboratory. Samples of all deliveries are sent to the laboratory for testing immediately on arrival at the factory. The system of testing must be devised to give the most useful results in the shortest possible time. Elaborate chemical analyses are to be avoided in routine testing as much as possible. It is preferable to use tests which will indicate the behavior of the product under manufacturing conditions.

With spices, for example, the flavor of an extract made under standardized conditions is of more value than determinations of essential oil content, ash content, etc. With canned fruits or fresh fruits to be used for preserves or jellies, it is more informative to make up small batches of preserves under controlled conditions than to make determinations of pectin value, pH value, and soluble solids content. Chemical analyses are nevertheless of much value and should be made to assist in understanding the behavior of the products. Meats, vegetables, raisins, dates and other perishable or semi-perishable products, where the quality of the bulk of the delivery is of more importance than analytical figures taken on a small sample, are inspected by a responsible member of the technical staff upon delivery. Deliveries of a new variety or from a new supplier are given particular attention and trial runs under standardized conditions are made before actual use in the product, to eliminate unexpected variations. Tests for purity must be made continuously to ensure freedom from spray residues with fruits and vebetables, freedom of general raw materials from undesirable preservatives, or contamination with heavy metals (although instances of such contamination are now rarely found). Storage of raw materials must be arranged so that deterioration will not take place from exposure to high temperatures, excessive humidity, insect infestation, freezing or other undesirable conditions.

During the manufacturing operations, many checks, chemical and physical and organoleptic, are made which will assist in the maintenance of quality and uniformity. For example, with preserves and jellies, each batch is cooked to a specified temperature and checked for soluble solids in the cooking department before the batch is filled. Samples are cooled rapidly and examined for set, flavor and appearance. Samples of filled packages are taken by the laboratory staff at the beginning of the run and checked for soluble solids, filling weight, set, flavor and appearance, so that any deviation from standard can be detected at once and necessary adjustments made in the cooking department. Subsequently samples are sent to the laboratory at regular intervals for inspection and any variation in flavor, set, color, etc., is followed up and corrected immediately. As a final check each run must be released by the laboratory before labelling.

Each batch of pickles must conform to specified standards for salt content, vinegar content, and sugar content before it is filled into packages. Samples of the packaged product are taken by the laboratory staff at the beginning of the day's run and checked for proper distribution of pickles and vinegar or sauce, and rechecked for analytical figures; subsequently, samples are sent to the laboratory at regular intervals for inspection.

Where consistency is important, as with fruit sauces, tomato catsup, and the like, each batch is tested for thickness by a simple viscosity test and blended with other batches if the correct thickness is not attained.

With soups, stews, and other canned specialties, reliance must be placed on selection and inspection of raw materials, close supervision of manufacturing processes and frequent inspection of the finished product during the day. All spices and other important ingredients are checkweighed by a member of the laboratory staff before use in the product. Samples of the first products filled each day at the canning line are sent to the laboratory and examined for flavor, consistency, distribution of solid ingredients, salt content, acidity or other measurable constants. Deviations from normal are followed up and readjusted immediately. After processing and cooling, samples are sent to the laboratory at specified regular intervals. The first processed and cooled samples each day are examined in the canning department by a committee of the technical staff to determine if any changes in materials or procedure are needed. All retorts are provided with recording thermometers which are checked for correct time and temperature at regular intervals by the laboratory staff. Every run must be approved in writing by the laboratory before labelling commences; usually the release covers a batch or a specified number of cans and a fresh release must be obtained when this run has been labelled. In this way the technical staff can keep its finger on the pulse of the manufacturing operations.

Another important feature of quality control is the daily inspection each day

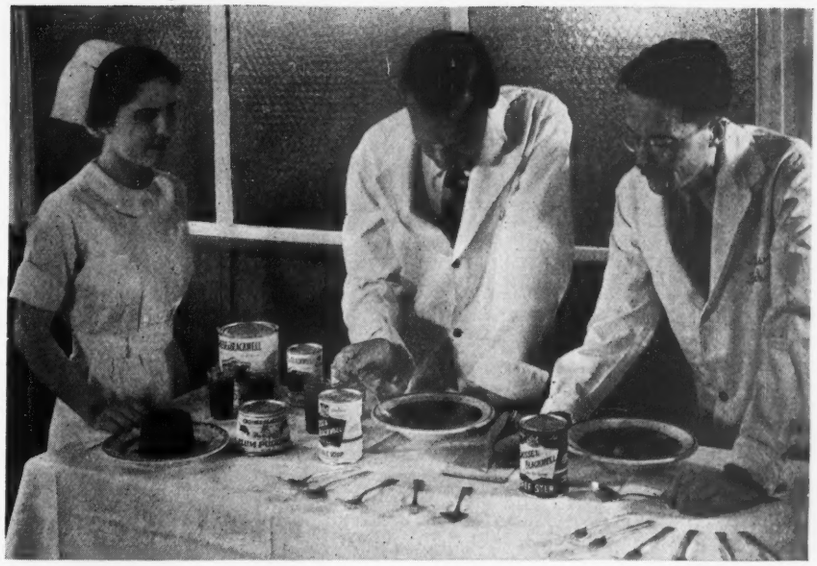
The chemical laboratory provides The Crosse & Blackwell Co. with much basic information essential to quality control work.

of the products packed the previous day. This is carried out in each department by a technical committee in conjunction with those responsible for production and provides an essential training for the production personnel in appreciating the qualities which are required in the products. The committee considers the pertinent analytical figures, vacuum, headspace, fill of container, flavor, consistency, appearance, and other important factors, recording observations for future guidance. Each day a definite number of samples are stored from each run of each product and these samples are examined after prescribed periods of storage in conjunction with those responsible for the production of each product, and observations and conclusions recorded for future guidance.

The control of tomato products is an interesting technical problem due to the perishable nature of the raw material and the volume which must be handled in a short time. Obviously, the quality of the raw material is most important. Buying on grade is of material assistance in insuring deliveries of high quality tomatoes. Close contact with growers to obtain a uniform rate of supply is also essential, although unusual climatic conditions will often upset the most careful calculations of the purchasing department and the technical staff.

For all tomato products, the operation of trimming the tomatoes is an important step, not only from the point of view of compliance with legal standards, but also from that of flavor and quality. Despite all efforts, most manufacturers of tomato products must contend at some time or another with tomatoes which are not as ripe as could be desired or which show more mold than is desirable. Something can be done by blending these loads with loads of better characteristics; but ultimately reliance must be placed on trimming and sorting. The proper place to check the efficiency of the trimming is at the trimming belt. It is important to make sure the foreman and foreladies in charge are thoroughly familiar with defects likely to occur in tomatoes and how to remove these defects with the utmost efficiency and economy. A good idea of the trimming performance can be obtained by careful inspection of a definite weight of trimmed tomatoes from each trimming line at definite intervals.

A continuous laboratory check of mold count is of course essential. The best method of applying the laboratory counts is open to question. Speed in counting is important. But accuracy must not be sacrificed to speed, particularly as the greater part of the time lag between time of trimming and time of obtaining results may be due to the time needed for the sample to reach the microscope for checking. Thus mold counts on a finished batch of pulp and catsup will not be obtained for an hour or more after the tomatoes have passed the trimming line and by that time the condition of the tomatoes may have changed completely.



The proof of the pudding is in the eating and all products of The Crosse & Blackwell Co. must pass eating tests carried out by a personnel trained to distinguish the factors of appetite appeal.

This seems to be a defect of various systems which have been described for installing signal lights at the trimming belts reflecting results of mold counts. For example, by the time the light shows red for a high mold count, good tomatoes may be coming along. But the workers, seeing the red light, will naturally think they need to do more trimming and unnecessary delay and waste in handling tomatoes may result. A system of telephonic or personal communication from the mold counting department, directly to those responsible for trimming, may produce better results, as the figures can then be correlated with the tomatoes actually going over the belt at the time when the sample was taken and not with the tomatoes going over the belt at the time of the counting.

Counts on the finished batches of pulp or catsup are of value in segregating doubtful batches, but are a little too late in arriving to be of value in preventing high counts from arising. The most practical way of obtaining results of value is probably to make frequent counts on the cyclone juice or extractor juice which should be available within fifteen minutes of the time of running the tomatoes, using counts on finished batches as a further check.

Control of consistency in catsup is also rather difficult, as no satisfactory way appears to be available of predicting the consistency with any great accuracy and by the time results are available on any batch, several more will be under way.

With all tomato products, problems of flavor and color must be kept constantly in mind and all responsible for handling the materials of finished products at all stages must be familiar with the effect that delays or variations in handling procedure will have on the finished product. Prompt and thorough cooling of all tomato products is particularly important. As with other C.&B. products, the day's run of tomato products is divided up into batches or other subdivisions which are released by the laboratory before labelling or storing, with the object of insuring that the technical staff is familiar with the products as packed and to enable necessary adjustments to be made. Samples are taken for storage and subsequent examination, as with all C.&B. products.

The above checks and inspections necessarily deal with the general quality of the product. But in the packaged food industry, where a day's run may amount to many thousands of packages of any particular product, the quality and uniformity of each individual package is of vital importance to the consumer and hence to the manufacturer. This quality and uniformity can only be obtained by thorough training and constant supervision of the individual workers. Every employee dealing with the preparation of the raw material must

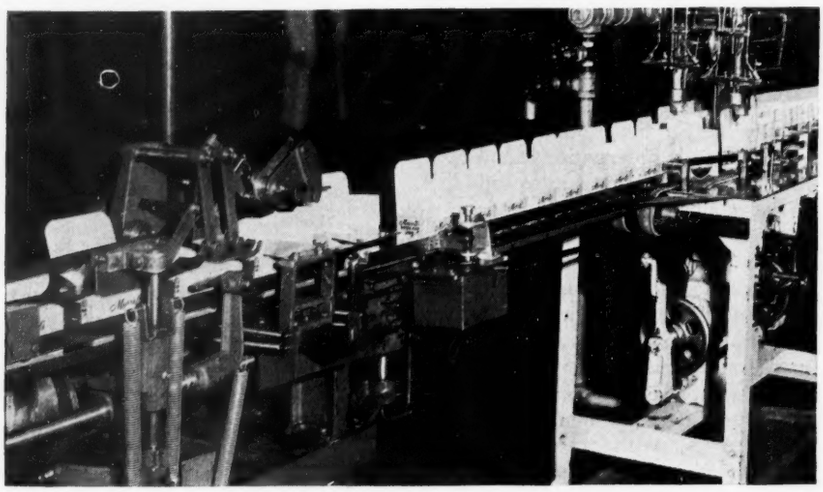
(Turn to page 227)

Progress in PACKAGING MEAT PRODUCTS

Part II

Much has been learned about economical design and construction of cartons and shipping containers, and much cost has been eliminated.

By F. D. CUMMINGS *
Director in Package Research
John Morrell & Co., Ottuma, Iowa



Automatically filling and closing Morrell lard cartons at a speed of 3,600 cartons per hour. For sausage cartons, one packer used general-design containers, with labels for product identification, and reduced stock sizes from 62 to four general-design cartons.

WELL-DESIGNED CARTONS for dispensing products are becoming a necessity in the new methods of merchandising, and too much care cannot be used in determining the proper specifications as to size, type of board and design.

To determine the material to use, one must be familiar with the various types of board—which include bond, patent coated, unbleached and bleached manilas, news, chip, glassine, etc. Each has a definite place in well-written carton specifications.

The size must take into account the ease in packing and at the same time the product must fit snugly to avoid shifting of the contents, which will result in damage. Corner locks, tuck-ends or cover must not be of such design as to create waste in the manufacture of the cartons or to increase packing costs.

Labels have proven very effective for use with general-design cartons for the packing of fresh and smoked sausage made with and without cereals, colored and uncolored. One packer reduced carton stocks from 62 sizes and texts to four general-design cartons with labels for product identification. This change not only greatly reduced his inventories, but it reduced carton costs by making it possible to order a few cartons in larger quantities. It also eliminated the possibility of loss through some cartons becoming obsolete.

Slight changes in the type of board, made practical through changes in the methods of preparing or wrapping meats, will lower carton costs and result in large annual savings. A saving of $3,000 was made on one order for sliced-bacon cartons by a packer changing the specifications on paper stock.

Any shipping container which will render more service than is normally required of it, or is incorrectly designed as to economy, involves a waste in one or more of the following: materials, labor, space or transportation charges.

Perhaps the greatest savings in packaging have been in the revised specifications for shipping containers. Too often, shipping containers have been designed far in excess of the actual requirements. Too often, costs have been greatly increased because of one complaint that the containers arrived at destination in a damaged condition, without first making a thorough investigation to see what may have caused the damage.

There are many methods and testing apparatuses for determining the quality of shipping containers, but the performance record in actual shipments should be carefully studied. Should the performance record be 100 per cent perfect, some lowering of the specifications might be justified the next time containers are requisitioned. You may be wasting a lot of money due to your containers being of a higher standard of quality than neces-

▶Cartons and shipping containers are two of the most commonly used food packages. So this article, which points out means of cutting the cost of these containers, has a message of dollars and cents value for

All Food Manufacturers and Distributors

* From a paper presented at the annual convention of Institute of American Meat Packers, held in Chicago, Oct. 22-26, 1937.

Slicing and packaging Morrell bacon at a speed varying from 700 to 1,500 lb. per hour, depending upon the average weight. Changes in the paper stock of sliced-bacon cartons enabled one packer to save $3,000 on one order for those cartons.

sary. Should your containers perform poorly in actual service, a raising of the specifications should be made to avoid customer dissatisfaction and heavy claims.

When we consider changes that have been made in lowering container costs, we must not overlook the fact that some changes have been made possible through improved methods of container manufacture and the willingness on the part of transportation companies to use more care in the handling of packaged products. I can recall when it seemed advisable to pack 50-lb. cans and 100-lb. drums of lard in solid wood containers, while today we are using light veneer crates without ends and also corrugated containers. In some instances there is no protection at all, except car blocking.

Let us consider briefly the various materials used for shipping containers and their place in the packaging of packinghouse products. Many of the specifications for 600-lb., solid wood export containers have been reduced from 13/16 to $\frac{5}{8}$-in. material, and some packers have adopted plywood with very satisfactory results. Materials for domestic containers have been reduced from 13/16 to $\frac{1}{2}$ in., and from $\frac{1}{2}$ to $\frac{1}{4}$ in.

What appeared to the manufacturers to be radical reductions have been made in the use of veneers. These have been reduced from $\frac{1}{4}$ to $\frac{1}{8}$ in. and, for some of the very small containers, to 1/10 in. Cleats have been reduced from 13/16 to 9/16 in., either tongue-and-grooved or mitred.

I recall the time in our organization when we decided to make sharp reductions in our specifications for veneer containers and our connections very politely informed us that the changes were unreasonable. We were determined, however, to bring veneer prices more in line with paper and took the risk of changing, with apparently satisfactory results. These reduced specifications demand more uniform quality and workmanship in the manufacture of our containers.

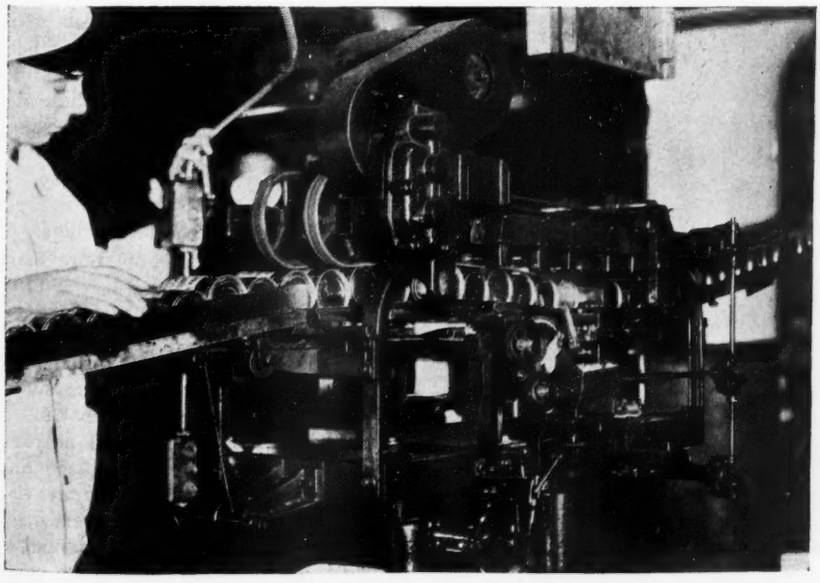
In connection with this type of container, mention should be made of the different types of closures, consisting of "Rock" fasteners or loop fasteners. While these are not new, their use is becoming more general. These closures may be obtained at a slight increase in cost. And when one considers the ease in closing and opening the containers for customer inspection, and also the reduced hazard to workmen, some increase in cost with either closure is justified.

We now consider paper as it applies to the fiber and corrugated shipping containers. Much progress has been made in the manufacture and use of paper containers in the meat packing industry, and these containers have become generally accepted by handlers and the trade.

Fiber and corrugated containers are being used successfully for the packing of fresh meats. Various methods of moistureproofing have been used, however. These include waxing one or two sides and using moisture-resisting compounds between liners or in the manufacture of strawboard. Some packers prefer, however, to continue the use of regular board, lining the containers with plain or printed waxed paper.

Moistureproofing has been considered very important in retarding the penetration of moisture through the liners and into the chip with consequent weakening of the containers. However, now that some of the container manufacturers have developed a better quality of chip, which is more or less moisture-resisting or non-absorbent, and have been able to obtain adhesives for satisfactory lamination, it is hoped that container costs may be lowered by eliminating some of the moistureproofing that has been considered advisable.

"B" flue corrugated containers have been adopted for most canned food shipments and have become very prac-



Labeling 1-lb. cans of Red Heart dog food at a rate of 18,000 cans per hour, a speed that can be attained only when labels and adhesives are of the proper type.

tical for shipping lard in pails and cartons and for shipping smoked and cooked meats.

Railroad requirements, or those of Rule 41, of course, represent the minimum that can be written in your standard specifications, but this is not always enough. The appearance and construction of all containers is to be uniform, and the containers must be correctly glued, formed, slotted, creased and scored. In the case of regular slotted containers the outside flaps should meet properly. When flaps are not required to meet, or when other types of containers are desired, this should be covered in your specifications.

For some containers carrying the maximum load, the specifications should cover kind of liners, weight of liners, caliper and bursting test.

At the present time, there are several standard liners in use, such as Fourdrinier kraft, available in either dry or water finish, jute board, cylinder kraft and cylinder filled kraft. On Fourdrinier and cylinder kraft, 100 per cent sulphate is obtainable; jute is a mixed paperboard with outer liners of kraft.

The color of the outside liner should be uniform and clearly specified, or buyers should submit a sample to be matched. The trend, however, seems to favor natural-color liners for most containers, although decorative outside liners are increasing in popularity for special packages.

Specifications for corrugations for containers should include material which is obtainable in strawboard, chestnut, pine wood or sulphate kraft. Specify the caliper, weight and whether "A" ($\frac{3}{8}$-in. high) or "B" ($\frac{3}{16}$-in. high) flute corrugations are wanted. Specify whether containers are to be taped or stitched. Stitching for "B" flute containers and tape for "A" flute containers represent, however, the general practice in the fiberbox industry.

Fiber is being used successfully for exporting, although not a recent development. Here again, the performance test is the real guide for writing container specifications. Several months ago, I wrote the specifications for export fiber containers for canned foods upon some advice from container manufacturers. These specifications proved unsatisfactory to railroad and steamship handlers and to our export outlets. Our sales department requested that we adopt solid wood. I was confident, however, that a fiber container which would prove satisfactory could be worked out. I revised the specifications and observed the containers being packed in the plant and being transferred from railroad cars to the steamer with no failures. As a result, the fiber container received the approval of our export connections and has been used extensively, keeping our package costs considerably under what they would be with solid wood.

Crinkled kraft bags and stockinets have been used freely for the covering of beef and lamb, replacing much of the costly wrapping in sheets of paper and sewing in burlap. The basic weight of kraft for bags varies from 25 to 55 lb., and for stockinets 30 yarn is being used successfully. Stockinet specifications should include size of yarn, size of needle, length of bags and guaranteed weight per thousand bags.

In some instances, skinned veal is being wrapped completely in a heavy cotton sheeting, soaked in a mild saline solution. Over this is placed a cover of either white or brown, single or all-way stretch, heavily saturated paper. I understand this type of covering is giving very satisfactory results.

Cellulose casings for fresh pork sausages and for cooked and smoked meats have become very popular. In addition to performing the functions of a good trademarked container—full protection to the product and responsibility for quality and conditions of manufacturer—these containers also afford a view of the products packed in them.

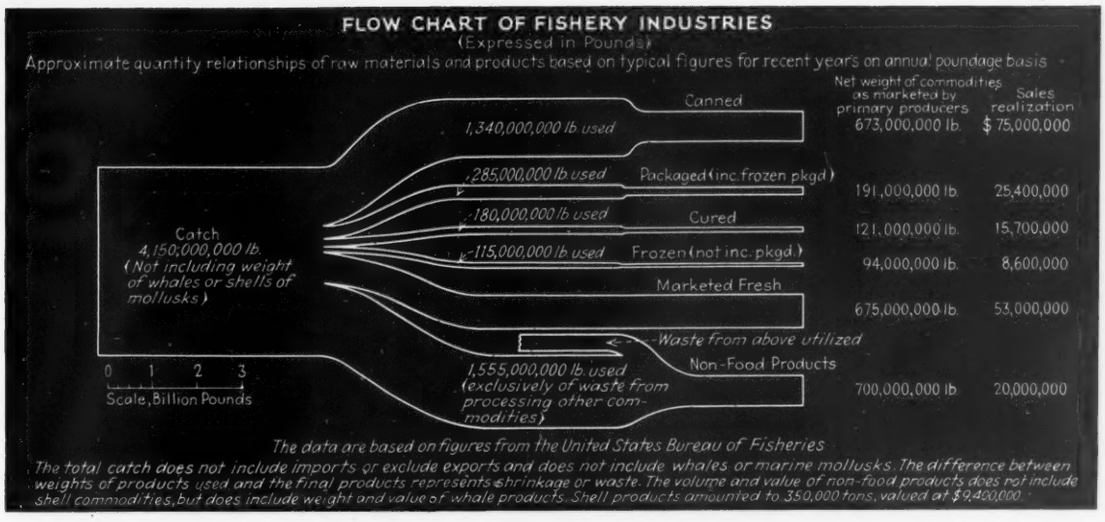
Growing importance of "eye appeal" as a food sales factor in the retail store is influencing packers to give more consideration to the glass container. Decorative tumblers are being used freely for sliced dried beef and spreads; artistically designed jars are being used for cooked meats in vinegar, etc. Various types of closures are being used to suit the fancy of the different packers.

Last but not least in packaging costs is the use of cans, pails and drums. The use of materials has been well established by the can manufacturers. But I understand that sizes for the same kind of product and net weight vary greatly, which only tends to complicate the manufacture of cans and increase the cost to the packers.

In all other types of packaging, we write the specifications which have proven sufficient to adequately take care of the product. This principle for writing specifications for cans, pails and drums should eliminate waste, not only in tinplate but in shipping containers. It would be well for package men to check over their specifications for tin containers to see what changes might effect savings.

Package standardization more than repays the alert packer for the time and expense necessary to effect it. True, there are occasional instances where a complete standardization program may be commercially unsound. The fact remains, however, that more work in this direction would be carried out if packers only realized the potential profits accruing from co-operation between sales, advertising, purchasing and operating departments toward an effective packaging program. The trend is for closer co-operation.

Packaging Red Heart dry dog food at a speed of 1,500 cartons per hour. Operator is feeding carton into machine, which applies and seals transparent-cellulose wrapping.


FLOW CHART OF FISHERY INDUSTRIES
(Expressed in Pounds)
Approximate quantity relationships of raw materials and products based on typical figures for recent years on annual poundage basis
Net weight of commodities as marketed by primary producers
Sales realization
Canned
1,340,000,000 lb. used
673,000,000 lb.
$ 75,000,000
285,000,000 lb. used
Packaged (inc. frozen pkgd.)
191,000,000 lb.
25,400,000
180,000,000 lb. used
Cured
121,000,000 lb.
15,700,000
115,000,000 lb. used
Frozen (not inc. pkgd.)
94,000,000 lb.
8,600,000
Catch
4,150,000,000 lb.
(Not including weight of whales or shells of mollusks)
Marketed Fresh
675,000,000 lb.
53,000,000
Waste from above utilized
Non-Food Products
0 1 2 3
Scale, Billion Pounds
1,555,000,000 lb. used (exclusively of waste from processing other commodities)
700,000,000 lb.
20,000,000
The data are based on figures from the United States Bureau of Fisheries
The total catch does not include imports or exclude exports and does not include whales or marine mollusks. The difference between weights of products used and the final products represents shrinkage or waste. The volume and value of non-food products does not include shell commodities, but does include weight and value of whale products. Shell products amounted to 350,000 tons, valued at $9,400,000.

What TECHNOLOGY Is Doing for the *FISH Industry*

Recent developments are creating new industries, opening new avenues to profit and contributing to the health of the people

By J. R. MANNING
Chief Technologist,
Bureau of Fisheries, Washington, D. C.

PEOPLE ARE INCLINED to regard fishing as a source of food or of recreation. However, that is only a small part of the story. Almost equal importance attaches to fisheries as a source of raw materials for the manufacture of a great variety of useful products, ranging from foods and drugs to clothing and automobile lacquers.

Technological research in the fisheries covers a broad field which necessarily involves the sciences of chemistry, physics, bacteriology, pharmacology and general food technology. It must work toward the development of new processes and methods, the salvage of waste products and the more complete economic utilization of the fishery harvest.

The many industries using fishery products are all vitally concerned with the proper conservation and wise exploitation of aquatic resources. For instance, feed manufacturers have followed with considerable interest and have utilized profitably the improvements in the manufacture of various types of fish meal. Likewise, the modern poultry industry could hardly exist without the fisheries' contribution of vitamins A and D in biologically tested fish oils and fish-liver oils. Contrary to popular notion, baby chicks, rather than human babies, consume most of these oils.

The fisheries also provide valuable raw materials for the drug industry. One example of this is the discovery in recent years by a Danish investigator of a new and greatly improved form of insulin that can be prepared from the sperm of certain fish. This product, commonly known as protamine insulinate or protamine sulphate, has been a great boon in the treatment of diabetes. The prospects for development of other medicinal products from the fisheries offer considerable promise.

One of the greatest of the fisheries' problems is the chemistry and bacteriology of spoilage of fishery products. Until more is known, it will be difficult to devise the best standards of production for both quality and uniformity. This applies to the manufacture, handling and distribution of the primary products of the fisheries for human food and also of the by-products for animal feeding.

This problem demanded first the development of tests for accurately determining the freshness of such a perishable material as fish. Technologists of the Bureau of Fisheries have developed an electrometric method for detection of the relative freshness of such non-oily species of fish as haddock, cod and the like. It is based on changes in the pH (acidity) of fish in the progressive stages of decomposition. The method is now

Byproduct utilization, seasonal overproduction, rancidity, packaging, testing for freshness, controlled smoking, and storage temperatures and humidities are problems to which fishery technology is being applied. One or more of these problems are of interest to
All Food Processors and Distributors

being applied by a large producer of fishery products, with simplified apparatus developed for a test on a commercial scale. (A publication giving complete details concerning the method may be obtained by writing to the U. S. Bureau of Fisheries.) This method, when put into widespread use in the industry, should save thousands of dollar by checking spoilage.

Another real problem is the question of rancidity, its causes and prevention. Since most of the commercially important species of fish fall in the general classification of oily or fatty fish, this problem is one of tremendous economic significance. Great losses result from the development of various forms of rancidity, so-called "rusting" and oxidization of fatty fish. Technologists have made some progress towards the solution of this problem, and they are now studying various harmless anti-oxidants or inhibitors of rancidity.

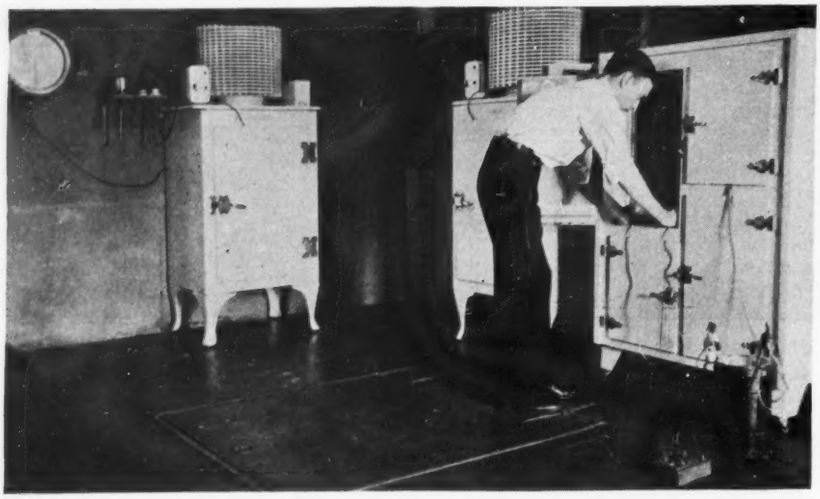
The smoking of fish and other foods as a means of preservation is shrouded in the dim mists of antiquity. But, like many ancient accomplishments, it is an art rather than a science. Therefore, the use of smoke in preserving food has depended largely on the skill of the individual, it being a more or less rule-of-thumb method rather than one of uniformity or one based on scientific control.

Technologists of the U.S. Bureau of Fisheries developed recently a model smokehouse whereby temperature, humidity, volume of smoke and other factors which may influence the finished product are under complete control. In this way it is possible to prepare a smoked product of high quality and uniformity. The details of this method will, it is hoped, be of importance to all food industries.

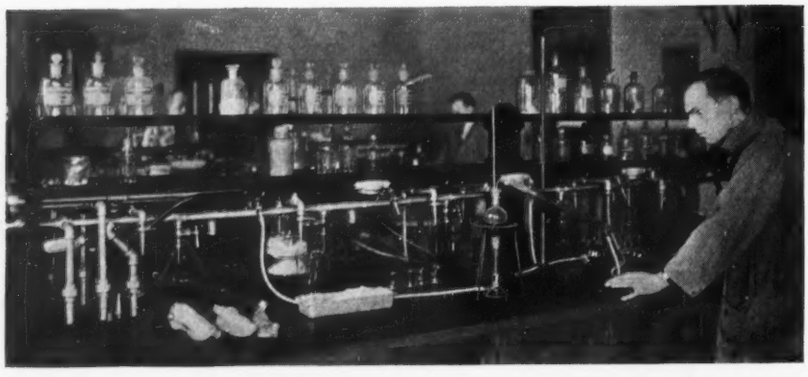
Since the reduction of the number of bacteria present in fish is essential to the preservation of fish, any device or method which can be found to bring about this accomplishment is vitally important to the industry and to the consumer. It is well known that the use of ultra-violet rays has been beneficial in reducing the number of bacteria in certain food products. Therefore, technologists of the Bureau are now studying the value of ultra-violet rays, as given off by a mercury-vapor lamp, for killing the bacteria responsible for fish spoilage. They are also interested in determining whether the irradiation of fish by this method will have any favorable effect on vitamin D content.

Another great problem of the fishery industries—a common one for all industries based on the exploitation of natural resources—is the one of seasonal gluts, or irregular production. This problem has both economic and technological aspects. The economic aspects, in their influence on distribution and prices, are quite obvious, although the most practical solution may be a technological one. It may

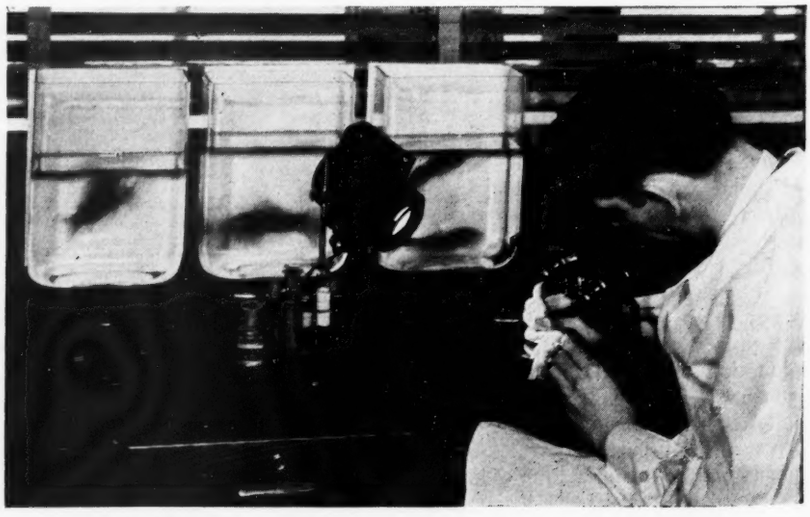
(*Turn to page 222*)



Storage temperatures, so important to the fish industry, are studied in this refrigeration laboratory of the Bureau of Fisheries at College Park, Md.



Chemical laboratory of the Bureau of Fisheries, located at College Park, Md.



Research scientist examines a fish at the Bureau of Fisheries biological laboratory which is located at Seattle, Wash.

Manufacture of *Applesauce* in the DIGESTER or PRESSURE COOKER

By W. D. PHETEPLACE, JR.

Research and Technical Development Division, The Pfaudler Company, Rochester, N. Y.

CANNED APPLESAUCE is defined by the United States Department of Agriculture as "the product made from sound, fresh apples (*Pyrus Malus*) of proper ripeness, after proper washing, peeling, coring, pulping and processing; with or without the addition of sugar (sucrose); packed in hermetically sealed containers, and sterilized by heat."

The variety or blend of apples, used determines to a large degree the quality of the applesauce to be made, although the best variety or blend can be easily impaired through improper subsequent handling.

Any good variety of apple that has tartness may be used for the preparation of the blend for applesauce. Varieties lacking in flavor when used alone produce an unsatisfactory product. However, apples of mild flavor may be blended with more acid or tart varieties to produce a pleasing sauce. Usually the most satisfactory applesauce is made from a blend of varieties that requires only a minimum amount of sugar to obtain the desired body and tartness. Once a desired blend and flavor has been established, it should be adhered to as closely as possible so as to insure a standard "brand" for the trade.

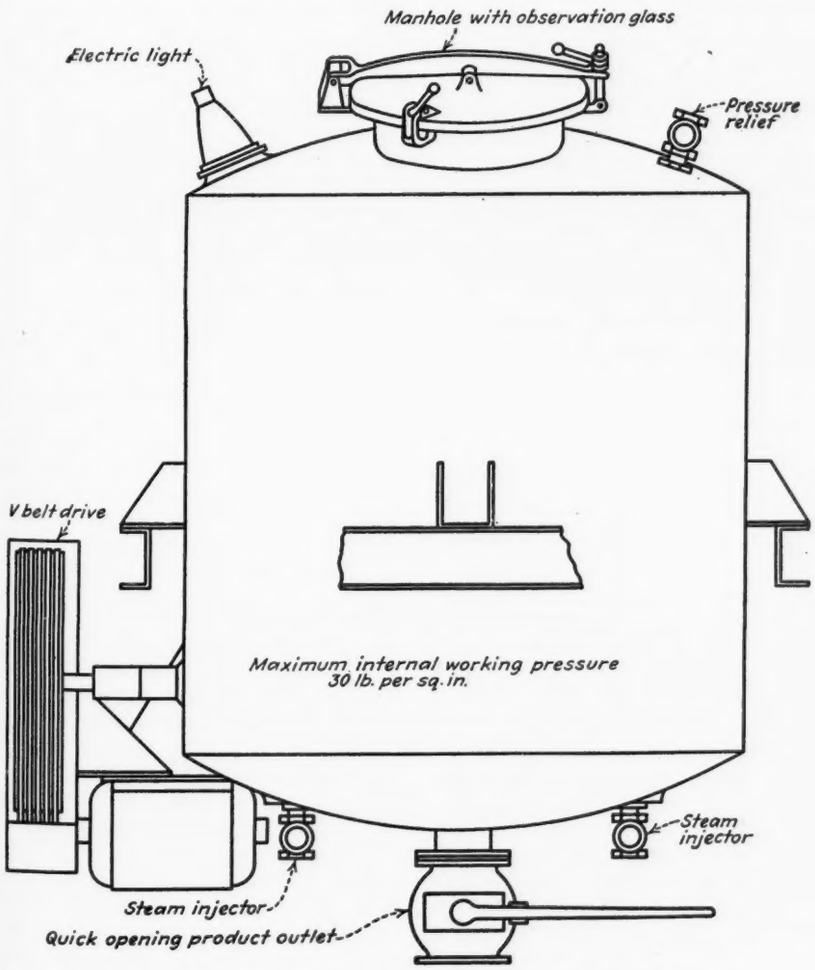
Greening, Baldwin, Dutchess, Red Astrachan, King, Virginia York Imperial and Blenheim are among the many varieties, depending upon the locality, that may be used for the manufacture of applesauce.

Applesauce is very susceptible to darkening by oxidation during its preparation. Also, it should be remembered that this product is highly susceptible to metallic contamination. During manufacture, contact with iron and copper should be avoided as far as possible. For this reason, glasslined steel, in combination with 18-8 steel alloy fittings, are ideal acid-resisting materials for use in making this sauce.

Apples from storage are moved along inspection belts where unsound fruit, leaves, and other undesirable material are removed. Weighing and blending should be done with whole unpared fruit because the pared apples must be handled as quickly as possible. The apples then pass along to the paring and coring machines.

One digester cooker unit requires at least 1,800 lb. of pared and cored fruit per batch. As the digester should be filled as quickly as possible, fifteen minutes should be allowed for this part of the process.

One standard parer will handle 15 bu. per hour and deliver at least 500 lb. of peeled apples in this time interval. (Information given here is by the courtesy of W. M. Pease of F. B. Pease Co., Rochester, N. Y.) As these machines are rated on an hourly basis, the digester will demand 7,200 lb. per hour capacity of the peeling machines. Fifteen machines, at 500 lb. per hour each, have a total capacity of 7,500 lb. per hour, which is more than equal to



Sketch of the digester or pressure cooker used in the process of applesauce manufacture described in this article.

the requirements of the digester. The production or yield of the digester will be considered later.

The apples, after paring and coring, immediately pass through a strong spray of cold water. This washing removes any material that may be sticking to the fruit and helps to prevent discoloration through surface oxidation.

Where apples are not immediately put into processing they should be immersed in a brine solution, within 1 to 1½ minutes after peeling, in order to prevent darkening. Brined apples should be chopped or otherwise processed within fifteen minutes after they have passed through the salt brine. For holding the peeled fruit, a cold brine of 2.6 per cent sodium chloride (common salt) has been found very satisfactory for retarding oxidation.

While the apples are being fed directly to the digester cooker unit, a blanket of steam at low pressure is kept over the pared fruit. The use of brine and the blanket of steam minimizes the danger of discoloration through oxidation. Another source of discoloration is eliminated by the fact that for cooking in the digester it is not necessary to chop or cut the apples. The whole fruit, peeled and cored, is fed directly from the brine tank to the cooking unit.

The digester type of pressure cooker has enjoyed a great success in the manufacture of baby foods, because it makes possible the exclusion of excess air, and is speedy and easy to operate. The same principles of cooking without excessive oxidation apply to the manufacture of applesauce, a product that should possess a typical, uniform, bright color throughout.

THE DIGESTER METHOD of cooking applesauce produces a finished product that is about equal in whiteness of the original apple pulp and has a natural flavor.

Steaming or cooking in the digester is accomplished by means of special injectors that feed clean live steam, free from excess condensate, to the whole apples. Cooking in a completely closed tank, under pressure and a blanket of steam, prevents the darkening of the product that would otherwise result from exposure to the air in the ordinary cooker.

The absence of coils in the digester is an important factor. It assures against sticking, burning and caramelization of the sugars. The unit is easily cleaned as there are no crevices, tubes or mechanism in which apple particles can become lodged. Only one moving part is used, the combination impeller-propeller agitator. This serves to keep the sauce thoroughly mixed and insures a thorough distribution of the sugar. This agitator is constructed of corrosion-resistant 18-8 chromium nickel alloy steel, which has no effect upon the color or flavor of the final product.

The agitator operates at a stirring speed of 176 r.p.m. and is driven by a 5 hp., 1,160 r.p.m. motor with Texrope drive. It is so constructed that it cannot contaminate the food product with lubricant and requires practically no servicing attention.

Filling the digester prior to cooking is accomplished by the use of automatic conveyors from the brine tank and elevating systems which discharge directly into the top manhole opening. In one plant, the peeled and cored apples are carried from the brine tank in small dump trucks which in turn are unloaded through a hopper directly into the digester.

When the digester is about one-third full, the required amount of sugar is added as a layer. Then the balance of the apples is added. The amount of sugar used depends, quite naturally, upon the varieties used and their tartness. On the average, 10 lb. of sugar for each bushel of apples has been found satisfactory.

Cooking is accomplished by the direct injection of live steam at 30 to 40 lb. per sq. in. pressure. This method has an advantage over the jacketed kettle or open tank with coils in that it is not necessary to add water at the start of the cook, to prevent scorching, or sticking to the jacketed wall or coils, until the apples begin to break down. The direct addition of live steam causes the apples immediately to soften and to disintegrate, liberating the natural juices.

Steaming is allowed to continue for a period of five minutes before the agitator is started. This time interval allows the apples to soften sufficiently to prevent undue strain on the agitator and its motor. That this waiting period is necessary is shown by the fact that even after five minutes steaming, actual horsepower readings show 22.3 hp. for three seconds after pushing the starting button. In three minutes the demand reduces to 5 hp. and after running for twelve minutes the demand is 4 hp. Experience shows that the running load varies from 3 to 4 hp. after the first twelve minutes of steaming.

It is important to start steaming as soon as possible, as the steam stops oxidation. In one plant, a blanket of steam is kept over the apples while the digester is being filled. The use of clean live steam has been mentioned and by this is meant steam that is free from condensate, boiler compounds and dirty water. Clean steam is easy to obtain and a little thought in this direction will be well repaid.

Cooking or steaming with live injected steam at from 30 to 40 lb. per sq. in. is, on the average, continued for twenty minutes. After this period of steaming and agitation, the steam injection jets are closed and the agitator is allowed to operate for five minutes more before the product is discharged from the unit.

The disintegrated cooked apples are next fed through a direct connection to a paddle-type finisher.

The choice of the material of construction for the finishing screen is of great importance. At present, the most acceptable metals for this purpose are nickel or 18-8 chromium nickel alloy steel. The texture of the applesauce will be governed by the diameter of perforations used for the finisher screen. For a coarse grained sauce the No. 6 screen with perforations of .050 in. diameter is used. The No. 2 screen with perforations of .033 in. diameter is also a popular size for a somewhat finer texture.

Some canners use a blanket of well trapped steam in the finisher to help maintain temperature; however, with a proper layout of equipment this has not been found necessary. Where a balance tank is used in the lineup, it is well to use a jacketed unit with stirrer. Low pressure steam may be used to maintain the desired filling temperature.

The Merrill and Soule corn filler, popularly known to canners as the M. & S. filler, is used for filling applesauce. So as to maintain temperatures, the filling machine should be as near the balance tank or finisher as possible. Under no circumstances should the closing temperature be lower than 180 deg. F., and the usual temperature for No. 2 cans is 200 deg. F.

Where a high closing temperature is maintained it is not absolutely necessary to retort or process the filled cans. However, it is best to use a ten to twelve-minute process in boiling water for No. 2 cans, as this avoids possibility of spoilage. Larger cans will necessarily require a longer processing time, this information being available through the can supplier.

To prevent "stack burn" and "pink applesauce," it is necessary to cool the cans from the process tank so that the temperature of the contents at the center of the can reach 100 deg. F. as quickly as possible.

Production Data

The following table readily shows that the yield of pared fruit per bushel of apples will depend directly upon the size of the apple and the number per bushel:

(*Turn to page 224*)

Sodium Alginate *As a Stabilizer*

By MERRILL J. MACK
Massachusetts State College, Amherst, Mass.

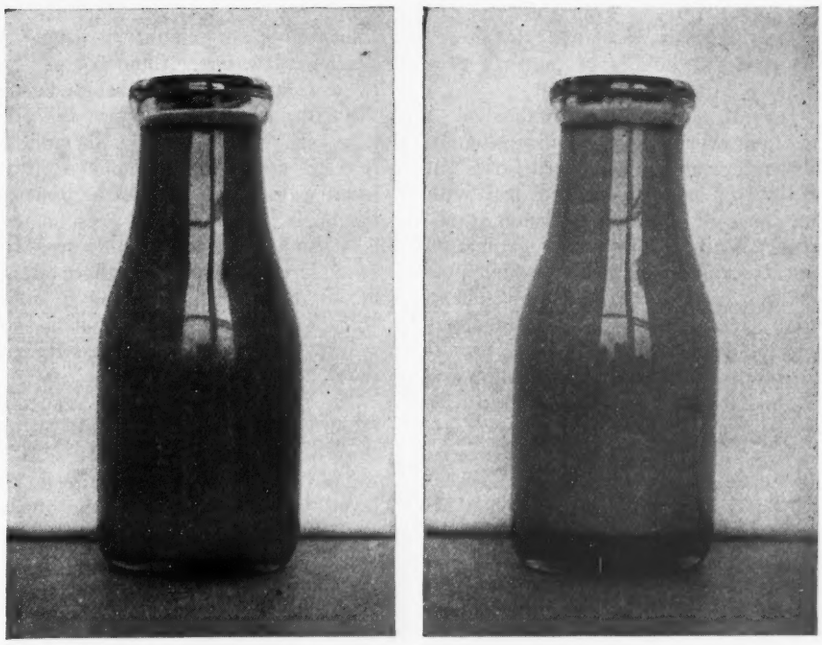


Fig. 1. Chocolate milk drink with and without stabilizer. The unstabilized product, at right, is light in color and shows a dark sludge at the bottom of the bottle. The bottle containing the drink properly stabilized with sodium alignate is uniform in color and free from any sediment.

MANY PRODUCTS can be improved considerably by the addition of a small amount of some suitable stabilizer. This practice with certain products, such as ice cream and ices, has been an accepted commercial procedure for many years. With other products, as chocolate milk and soft cheeses, the incorporation of stabilizer is a comparatively recent innovation.

The literature pertaining to the processing of dairy products contains many references to the properties of specific stabilizers. This is especially true of gelatin, and to a lesser extent of gum tragacanth, India gum, starches, agar agar, and pectin. Because of its recent introduction to the dairy trade, very little has been published concerning the properties and uses of sodium alginate. However, the unusually rapid acceptance of the product within the past three years is an indication of its comparative value as a stabilizer. Some of the stabilizers, as agar agar, pectin and the gums, may be suitable for a specific product (ices) but for general use in dairy products only gelatin and sodium alginate are satisfactory.

Vegetable gums when used in dairy products are likely to produce a "stringy" or "livery" product. Some of the vegetable stabilizers cause an undesirable separation of whey to appear when used in an ice cream mix. None of these defects is caused by gelatin or sodium alginate.

Gelatin may be dissolved readily in a hot water solution or by sifting slowly into the dairy product prior to pasteurization. The temperature of pasteurization will completely dissolve the gelatin if lumping has been prevented. Some care must be exercised when adding sodium alginate to dairy products if lumping is to be avoided. It cannot be added below a temperature of 160 deg. F. for complete solution. In sweetened dairy products, as ice cream mix or chocolate milk, the sodium alginate can be thoroughly mixed through a part of the sugar and added after the temperature has been brought to 160 deg. F. A better method of adding the substance is to mix it through some cold water so as to wet the small particles, then add this water suspension of the stabilizer to the dairy product after the desired temperature is attained. If these simple measures are carried out, no difficulty will occur with the use of sodium alginate.

Since so little stabilizer is added (usually less than 0.5 per cent), the color of the dairy product is not noticeably affected by the addition. The only possible exception is from undissolved particles which might result from improper addition of the stabilizer. Neither is the reaction of the resultant dairy product appreciably affected by the addition. The titratable acidity of ice cream mixes containing gelatin was found to be the same as

▶A stabilizer, as used in the manufacture of food products, is an ingredient which has the property of absorbing or uniting with many times its weight of water. The proper incorporation of a small amount of stabilizer is desirable in many food products because by its action the water is held more closely with the food solids. The advantages gained by using stabilizers, as set forth in this article, are of interest to makers of

Cheese
Cheese Spreads
Chocolate Milk
Ice Cream Mix
Ices and Sherbets
Sour Cream
Sweet Cream
Whipped Cream

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3. Mueller, W. S., Mack, M. J., and Lindquist, H. G. "Some factors affecting the properties of whipping cream and quality of the finished product." *Mass. Agric. Expt. Sta.*, Bul. No. 335, November, 1936.
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for plain mixes. The addition of sodium alginate, however, did lower the titratable acidity of the mix very slightly (.01 to .02 per cent).

Several states have established a maximum permissible stabilizer content for ice cream. This standard varies but in all cases it is 1 per cent or less, with 0.5 per cent the most common standard. With modern homogenization and freezing equipment, so much as 0.5 per cent of stabilizer is seldom used. The function of the stabilizer is to improve the body and make smoother the texture of ice cream, and at the same time neither seriously increase the viscosity of the ice cream mix nor injure the melting appearance of the finished product. Other essentials are that the mix be reasonably constant in viscosity and readily whip to the desired overrun during the freezing process. Previous experiments by the author (1) and by Stebnitz and Sommer (2) show that sodium alginate meets these requirements of a stabilizer.

SODIUM ALGINATE is more effective than the average high-grade gelatin, pound for pound, when used as a stabilizer in ice cream (1) (2). It produces an ice cream with a firmer body and smoother texture than is the case with an equal weight of gelatin. The mixes containing the sodium alginate whip as fast or faster than those containing other common stabilizers. The finished ice cream containing sodium alginate melts freely to a smooth, creamy liquid when eaten and does not seem "chewy" or soggy as is the case with ice cream made with some stabilizers.

One of the chief advantages of sodium alginate is that as soon as it is brought into solution, absorption of the water by the stabilizer immediately occurs. For this reason several hours of aging are not necessary and prompt freezing of the mix can be accomplished. Some manufacturers have virtually eliminated the aging period in this way and are making ice cream practically in a continuous process from mixing vats to freezers.

Since the viscosity of mixes containing sodium alginate is largely attained immediately upon processing and cooling, as shown in Fig. 2, the mixes are very satisfactory for re-sale. The viscosity remains nearly constant regardless of the age of the mix and is less affected by temperature change than is the case with gelatin mixes. Perhaps no physical property is watched more carefully by the average buyer of mix than the viscosity. A mix of good whipping ability is also desirable for this type of business.

Sodium alginate is a satisfactory stabilizer for ices and sherbets. A solution of it should be made by heating in water. About 0.4 per cent by weight of the stabilizer is needed. This is then combined with the other liquid ingredients and the formula for the ice or sherbet completed in the usual way. Freezing can be done immediately. The finished ices or sherbets should be smooth in texture, free from crumbliness, and there should be no difficulty in securing a sufficiently low overrun if a reasonably cold refrigerant is available when freezing these desserts.

A serious defect in chocolate flavored milk drinks has been the settling of particles of chocolate or cocoa to the bottom of the bottle. This layer of sediment injures the appearance of the product, necessitates considerable shaking by the consumer to get it back in suspension before pouring the milk from the bottle, and even then is only partially removed. The remaining sediment may dry fast to the bottle and is then removed with difficulty when the bottle is returned for washing.

The primary function of a stabilizer in chocolate milk is to keep the cocoa or chocolate from settling. Some vegetable stabilizer must be used for this purpose because the stabilizer must function immediately upon cooling. Sodium alginate is suitable because the major part of the viscosity is attained when dissolved, as is shown in Fig. 2, Gelatin is not satisfactory for this purpose because the sediment will settle out before the gel structure has been formed and the necessary viscosity attained. A number of prepared flavors are available in powder or syrup form that do not settle out when used in chocolate milk. The main difficulty with these preparations is that one must buy the chocolate flavor in order to get the stabilizer. It is obviously more desirable to buy the stabilizer separately so that one can use whatever cocoa or chocolate he wishes for the source of chocolate flavor. The principal advantage of the prepared materials is their convenience, particularly for small scale operations.

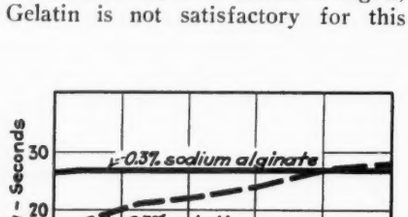


Fig. 2. Viscosity of mixes stabilized with gelatin and sodium alginate.

One ounce of sodium alginate will prevent the settling of sediment in approximately 4 gal. of chocolate milk. The chocolate milk is made by heating the cocoa and milk to 165 deg. F. At this temperature the stabilizer (mixed with about five times its weight of sugar) is sifted slowly into the hot milk. The rest of the sugar should then be added, the pasteurization process completed, the chocolate milk cooled to 40 or 45 deg. F. and bottled. This procedure should entirely eliminate settling of any sediment.

The addition of a stabilizer to cream is considered an illegal practice in many cities and states. However, the ice cream maker or baker may add stabilizer to whipping cream used in decorating fancy molds, cakes and other products, in order to reduce serum drainage from the whipped cream. In many restaurants, soda fountains and hotels, cream is whipped in quantity and stored in the whipped form until used. A stabilizer added to cream used in this way should increase its viscosity and improve its body and, at the same time, decrease serum drainage. The whipping time and yield should not be decreased unless an excessive amount of stabilizer is added to the cream. A number of stabilizers have been studied in experimental work with whipped cream at the Massachusetts State College (3). The stabilizers were dissolved in hot water and added to the cream before pasteurization. The addition of only 0.1 to 0.2 per cent of sodium alginate increased the viscosity of the cream noticeably and also decreased serum drainage.

Some stabilizer is frequently used in commercial sour cream to help thicken and make smoother the body of the product. Extra serum solids in the form of condensed skim milk or powdered skim milk may be used for the same purpose. Sour cream is made from sweet cream of 18 to 20 per cent fat. The stabilizer is dissolved in hot water and is added to the cream after it has been heated to 160 deg. F. One ounce of sodium alginate is needed to about 4 gal. of finished cream. The pasteurization process is completed, then the cream is homogenized at 2,000 lb. pressure and cooled to 65 to 70 deg. F. The cream is inoculated with sour milk culture and is held at this temperature (usually over night) until an acidity of 0.6 per cent is developed. The cream is then stirred gently until the body of

(*Turn to page 225*)

UNREACHED MARKETS For Baked Goods

A $500,000,000 Volume Is Still Available

By EUGENE SZEPESI
Director of Economic and Business Research
Miller, Franklin & Company, Inc.
New York, N. Y.

PART I

FOR A NUMBER OF YEARS the bakers have been told that their industry is on the decline because of the great technical improvements which reduced the energy requirements of the population.

This is an undisputed fact. The important point is, however, that this is *not* the cause of the apparent standstill of the baking industry. The bakers have by no means reached this "impregnable wall of economic circumstances" they have heard so much about. They simply have missed their opportunities because they have adopted a too compliant attitude. Instead of striking out into a progressive direction, they have but churned the water. Yet opportunity is still ahead of them.

The prime cause of their attitude can be ascribed to a single fact: the decrease of the "per capita" flour consumption. This decrease is serious to the milling industry; and it would be to the baking industry, provided all avenues of potential consumption for bakery products were exhausted. But the baking industry still has a potential field, not yet reached by its products, of over *a half-billion-dollar retail purchase value.* This is more than one-third of its present volume of business! No industry has the moral right to look to its future with apprehension when such opportunities are ahead of it.

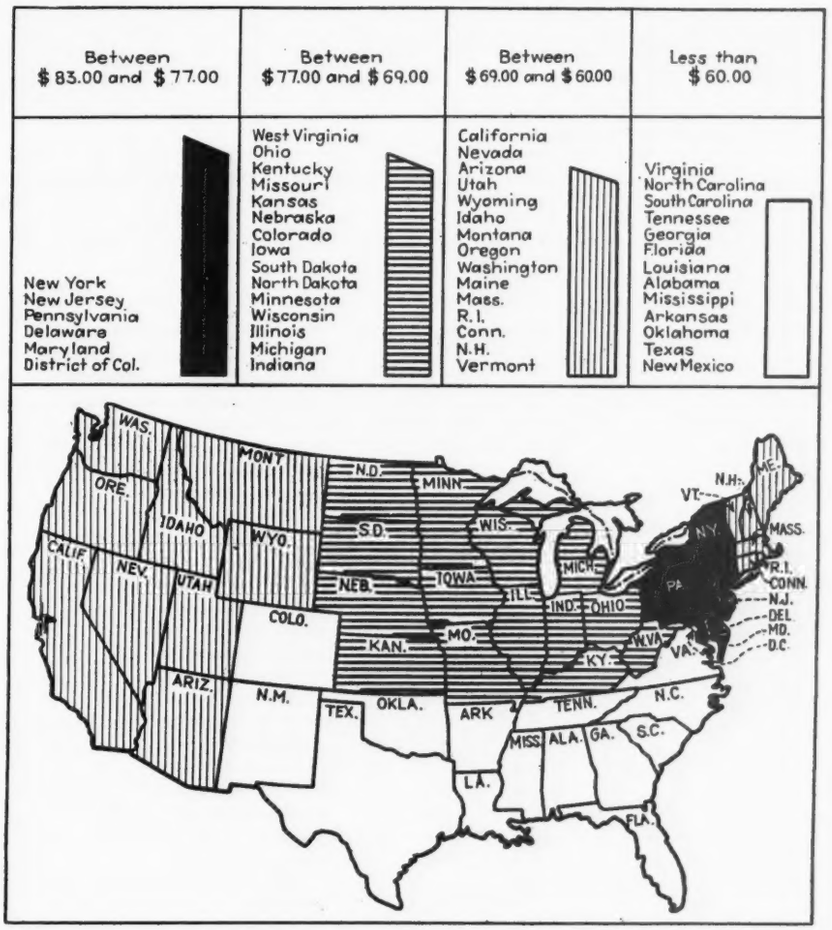
Where is this potential purchasing power? All over the United States. It represents the home baked products, and other sundry foods, instead of the bakery made products. Flour consumption may decline to new low levels, but if the industry succeeds in capturing even a part of this additional purchasing power, it can look ahead toward a prosperous decade.

To look further ahead during the present economic and social readjustment, would be, to say the least, a waste of time. Hence, the first thing the bakers should do is to forget that alarming curve of the declining flour consumption, which has recently flattened out, and concern themselves with the ways and means of determining how this potential market, still available, might be captured by the industry. It seems almost unbelievable that such a great opportunity could have been missed by the industry—yet this is the case. Whenever bakers have met, or whatever they have read, the subject has been always the "decline" of the flour consumption, and how to prevent it. They never visualized the potential market or how to capture it.

They have been thoroughly prepared for this negative attitude by the "Chamber of Horrors" in the form of impressive charts on the decline of everything—like the following:

Reduced birth rate of the population,
Small families,
Decline of consumption of flour, potatoes, meat, pork, sugar, etc.

Every possible reason, related and unrelated, has been given to explain why people don't eat more bread and other bakery products.



Above: Annual per family consumption of bakery products based on 1935 retail values of consumption by families of the urban and non-farm rural population.

Below: This map shows the distribution of the per family purchasing power for bakery products. It includes that portion of the income of the urban and non-farm rural families which is available for baked products.

The first constructive step the industry needs to take is to gather up every piece of literature giving the reasons why the industry is declining, and consign them to the furnace and forget about them. This accomplished, it should concern itself with finding out:

(a) How great is the potential consumption of baked products not yet supplied by the bakeries?
(b) Where is this potential market?
(c) Why has it remained dormant?
(d) How to capture this potential market?

Bakers should refuse to read and listen to anything else. It requires no clairvoyant ability to predict that, if the industry does these things coordinatedly, the consumption of bakery products *will increase* in spite of the gloomy predictions of the charts of the decline.

The first step should be the measurement of this potential market. Many complaints have been made that the industry has no dependable information on the consumption factors of bakery products. This is true, but the same facts hold good for all industries. The basic factors for the elements which makes up the potential consumption of bakery products are available, but they need to be adjusted and correlated into a complete dynamic picture of the whole.

The purchasing power of a market is not reflected through unrelated statistical facts. The market has to be measured—and the measure must be the right kind. The baking industry has in the past measured all economic factors in relation to the "per capita" consumption. This was the first error. The industry is not interested primarily in consumption, but in the *increase* of consumption, and this can be measured only by two things:

(1) The available purchasing power.
(2) The value of actual purchases.

For baked products, it is not the individual but *the family purchasing power,* which determines the size of the potential consumption.

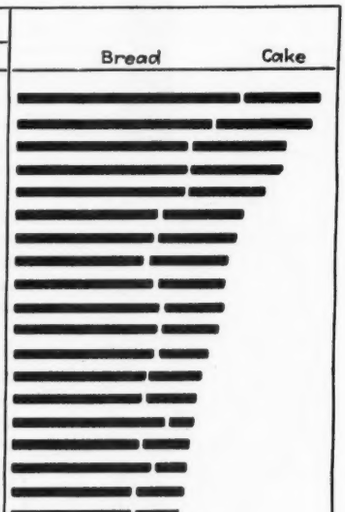
"Per Capita Consumption" includes everybody, while the commercial baker's market stops where the distribution ends; and this, for all practical purposes, is the country store. Up to this point, commercial bakery products have a universal distribution, and beyond it there is still a large undeveloped field. While the farmers in some sections of the United States may be regularly supplied at the present time with bakery products, for the greater part of the country this is not yet the case. Hence, the purchasing power of our farm population should be excluded from the calculations of the present potential consumption of commercially baked products. This does not mean that the farm market is beyond the possibilities of the bakers—not at all. It is a natural field of expansion, but it will require a careful study of the requirements, because the selfsame products, and mode of distribution that satisfies the urban market, is not suitable for farm distribution. In almost every state of the union the farmer-consumer represents a specific problem, because the density, character, and habits of the farm population changes with the product of their farms. Hence their eating habits and preferences will differ.

Even this measure for the "average" for the United States is meaningless because the "Family Density" and "Family Purchasing Power" varies with every state. The first measurement of the potential consumption of bakery made products per family must be computed for every state separately, as shown in Fig. 1.

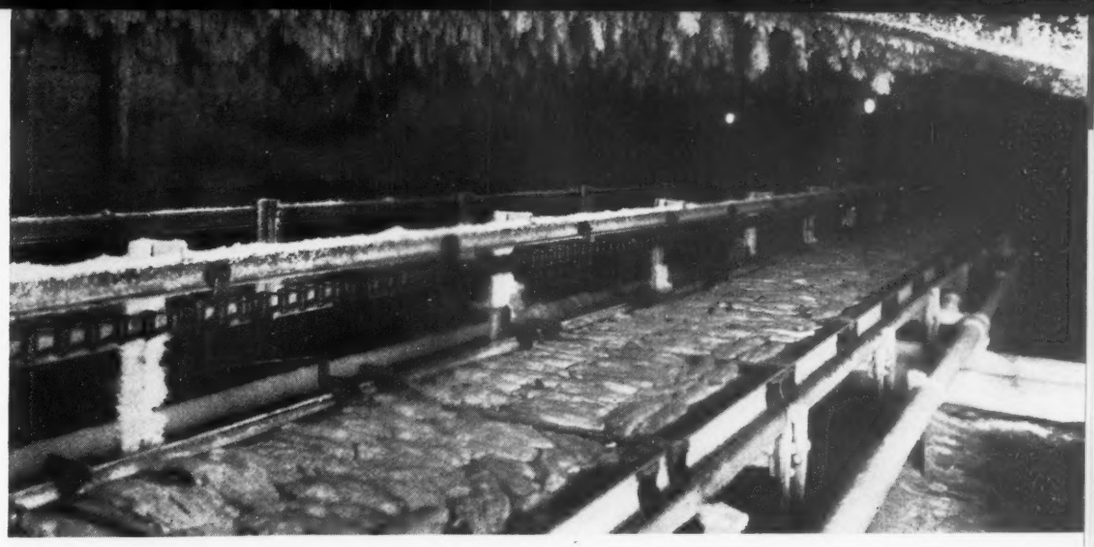
This table also illustrates the method of presentation, which permits the bakers of each state to compare the strength of their industry with that of other states. The fact that the Atlantic Seaboard is the best and that the Southern states are the poorest customers of bakery products is verified by this table. But the bakers of such states as Pennsylvania, Michigan, Massachusetts, Illinois, Ohio,

(*Turn to page 226*)

State	Consumption Dollars		
	Total	Bread	Cake
District of Columbia	94.27	69.30	24.97
Maryland	90.53	58.96	31.57
Rhode Island	83.49	52.58	30.91
New York	82.50	51.92	30.58
Pennsylvania	76.34	51.15	25.19
Michigan	68.75	44.00	24.75
Massachusetts	67.32	41.36	26.51
Missouri	64.90	36.08	28.82
Illinois	64.68	40.70	23.98
Ohio	64.24	43.67	20.57
New Jersey	62.64	42.57	20.08
Connecticut	57.75	41.03	16.76
Nebraska	55.00	37.40	17.60
California	54.78	36.74	18.04
Delaware	53.90	43.12	11.22
Wisconsin	51.48	36.63	14.85
Indiana	51.25	39.82	21.40
Washington	49.61	33.17	16.44
Maine	47.96	33.11	14.85
Oregon	46.88	33.77	13.09
Colorado	45.87	28.38	17.49
Montana	44.99	38.17	6.82
Utah	44.44	30.58	13.86
Iowa	43.78	36.08	6.38
New Hampshire	43.50	33.60	9.90
West Virginia	43.28	35.42	7.86
Vermont	43.01	33.88	9.13
South Dakota	37.62	30.47	7.15
Louisiana	36.79	27.23	9.57
Kansas	36.13	27.83	8.30
Texas	35.20	25.68	9.52
Tennessee	35.08	22.44	12.65
Georgia	34.76	22.22	12.54
Virginia	34.70	24.97	9.73
North Dakota	34.32	28.82	5.50
Minnesota	34.32	24.09	10.03
Oklahoma	33.66	25.63	8.03
Arizona	31.79	26.40	5.39
Florida	31.57	23.98	7.48
Kentucky	30.47	21.52	8.85
Arkansas	29.59	20.68	8.91
Nevada	28.49	22.55	5.94
Wyoming	27.39	22.77	4.62
Idaho	27.39	21.34	6.05
South Carolina	24.09	18.48	5.61
North Carolina	24.09	18.26	5.83
Alabama	23.54	19.80	3.84
Mississippi	21.12	17.98	3.14
New Mexico	12.21	8.91	3.30



Here is the potential market, based on the annual number of dollars available for each family to purchase bakery products. Figures are based on 1935 purchasing power, and arranged by states in order of the diminishing purchasing power.



Fish being frozen by one of the first quick freezing processes. This plant has since been abandoned.

QUICK FREEZING

Thaws Frozen Channels of Distribution

By IVAN C. MILLER
Distribution Editor

ALTHOUGH there have been many recent developments in the field of preserving food by freezing, the food freezing industries, which during 1937 carried a frozen stock of more than a billion pounds, is anything but a new industry. All these tons of food frozen for preservation were not, however, "quick frozen."

The first successful commercial preserving of foods by freezing in this country began in Baltimore in 1852 when milk and cream were successfully preserved in frozen form and sold as ice cream. (Ice cream was known in this country at the end of the sixteenth century.) This food, consumed in frozen form, should not be classed with foods thawed or defrosted before consumption.

A dire shortage of fresh meat in England between 1870–1880, and a surplus in this country spurred investigation of preserving meat by freezing. As a result, successful shipments of frozen meats were made from the United States to England as early as 1874.

Fruits have been cold-packed frozen for 30 years. During this time, frozen fruits have furnished most of the winter fruit supply of preservers, confectioners, ice cream manufacturers and pie bakers. The cold pack industry has gone through the rigors of the pioneering period. This industry's products are now staple articles of commerce—standardized raw materials for those industries which use them. Cold pack fruits are well enough entrenched to offer formidable competition to any other type of frozen fruits seeking to replace them in the industrial market.

Necessity Invents Quick Freezing

Just as the freezing of meat by mechanical refrigeration was born as the result of an emergency, so also was quick-freezing of fish brought about by emergencies that threatened disaster to the fishing industry. The fish catch is maximum in summer when the demand is minimum. During the winter, when the demand is greatest, only a small portion of the annual fish catch is brought to the fish piers.

In the interior of the country, beyond the immediate vicinity of the seaboard and lake fisheries, a huge unreached market has existed ready to absorb the annual production of the fisheries; but an adequate supply of fish to satisfy the demands of the entire country could not be profitably kept fresh and delivered fresh to this market. Fish is an extremely perishable product.

The study of methods of preserving fish and transporting it while still fresh to markets throughout the country resulted in the processes known as "quick-freezing" processes. This method of preserving fish in a state of natural freshness, resulted in expanded markets, fewer gluts, a supply curve leveled to conform to the curve of demand, and a threatened industry rehabilitated. Storage of preserved products during maximum production and minimum demand now supplies the market during greatest demand and least supply from the fisheries. Quick freezing thawed out the frozen distribution channels of the fish industry. Some type of rapid freezing, now employed by most of the fisheries, accounted in 1936 for 179,000,000 lb. of sea food frozen.

Not only are fish produced in abundance when the demand is least, but so are other perishable food products. Manufacturers and producers of these products are applying the knowledge learned in preserving fish.

Quick Freezing Applied to Other Products

Quick freezing or some adaptation of rapid freezing has been applied successfully to fish and seafood, meat and poultry, fruits, vegetables, bread and milk. However, the knowledge accumulated during years of intensive research and practical application of

(*Turn to page 202*)

Food pages from May issue of Pictorial Review

Will the MAY MENUS of Women's *Feature Your Product?*

IF YOUR PRODUCT is featured in the May issue of one of the women's magazines, (advance proofs reproduced on these pages), posters bearing reprints of the page illustrating your product, used as the center of a point-of-sale display in retail outlets, will materially increase sales of your product in those outlets.

Results obtained from tests made with the cooperation of both independent and group retail organizations have been reported in earlier issues of FOOD INDUSTRIES. These tests have proved two facts. Retailers generally welcome this type of display poster more than other types, and cooperate in giving it an opportunity to produce. This type of poster, made by mounting reprints of the illustrated food pages of the women's magazines, produced pronounced increases when used to stimulates sales.

As a result of these tests FOOD INDUSTRIES arranged with the women's magazines to obtain advanced proofs of these pages. The purpose of obtaining these advanced proofs is to describe and illustrate the forthcoming food pages of the women's magazines so that manufacturers whose product or products are among those featured may obtain ready-for-use posters bearing reprints of the food pages and place them in the hands of retailers at or about the same time the magazines reach their readers.

Mounted reprints of these food pages (single pages on 14x22 in. poster board, spreads on 28x22 in. poster board) may be obtained from the magazine ready for use at the following prices:

SINGLE PAGE

1,000 to 1,999 inclusive	15c
2,000 to 2,999 "	12c
3,000 and over	10c

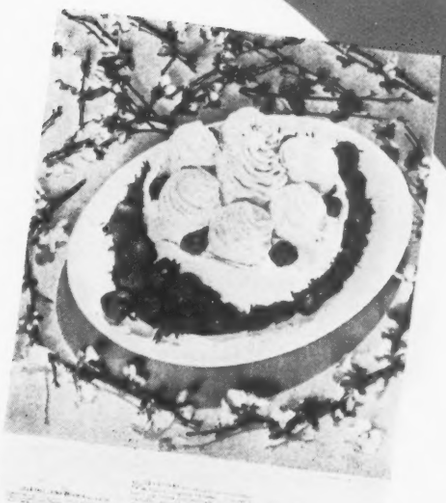
TWO-PAGE SPREAD

1,000 to 1,999 inclusive	25c
2,000 to 2,999 "	18c
3,000 and over	16c

Manufacturers may either correspond with any one of the magazines direct, if interested in food pages appropriate for their products or write to the distribution editor of FOOD INDUSTRIES.

Each poster will carry the printed line "As seen in the March issue of . . . . . Magazine." The manufacturer's own selection of caption or "selling slug" such as "Try these recipes suggested by McCALL'S," "Ham is traditional for Easter," "Try these Lenten recipes," "While Winter lingers—Griddle Cakes and Sausage," "Try these recipes made with canned soup," etc., will be printed at the top of the poster. No poster will bear the name of the manufacturer or his trade brand.

Food pages from May issue of McCall's



Food page from May issue of Woman's Home Companion

Magazines

McCALL'S: Full color spread suitable for promoting canned pineapple rings, apricots, cookies and gelatin.

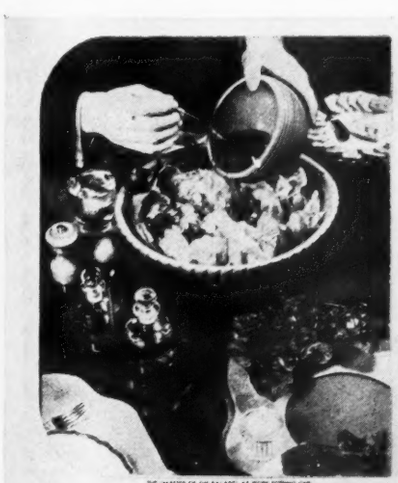
PICTORIAL REVIEW-DELINEATOR: Two color spread suitable for promoting mayonnaise, salad dressing and other salad ingredients.

WOMAN'S HOME COMPANION: Full color page suitable for promoting strawberry ice cream, eggs, flavoring extract and sugar.

GOOD HOUSEKEEPING: Full color spread suitable for promoting olive oil and other salad ingredients.

LADIES' HOME JOURNAL: Full color spread suitable for promoting canned tomato and asparagus soup, canned or frozen peas and mint jelly.

Food pages from May issue of Ladies' Home Journal



Good Housekeeping Institute—Katharine Fisher, Director

Food pages from May issue of Good Housekeeping

Warehouse Invoice of Frozen Foods

Product	Date	Quantity in lb.
Beef	Feb. 1, 1937	148,180,000
Pork	Feb. 1, 1937	322,765,000
Lamb & Mutton	Feb. 1, 1937	10.486,000
Edible Meat trimmings	Feb. 1, 1937	131,709,000
Fruits	Dec. 1. 1937	128,141,000
Vegetables	Dec. 1, 1937	32,122,000
Eggs	Dec. 1, 1937	120,789,000
Poultry	Dec. 1, 1937	108,787,000
Fish	Dec. 15, 1936	94,694,000

These figures from bulletins of the Department of Agriculture and Bureau of Fisheries, Department of Commerce, include foods frozen for preservation by cold-pack method, sharp freezing, quick freezing and all other methods.

freezing and distributing frozen fish greatly exceeds the knowledge resulting from the study and practical experience in processing and distributing the multitude of foods now being frozen. There was an emergency that justified freezing fish. There were unreached markets that assured outlets and the consumption of a steadily increasing flow of the industries' products. There is justification for freezing some of the other food products which are frozen today, but no justification for freezing all of them. Before adding new frozen products to the already too lengthy list, it is time to establish a market for those frozen products which can readily be marketed when frozen and discontinue freezing, at least at present, those products which do not obtain economical acceptance. Freezing—slow, rapid, or quick—is no panacea, no cure-all for the production and distribution problems of those who deal in fresh or canned foods, even though the pastures look greener in the frozen food field.

The Why of "Quick Freezing"

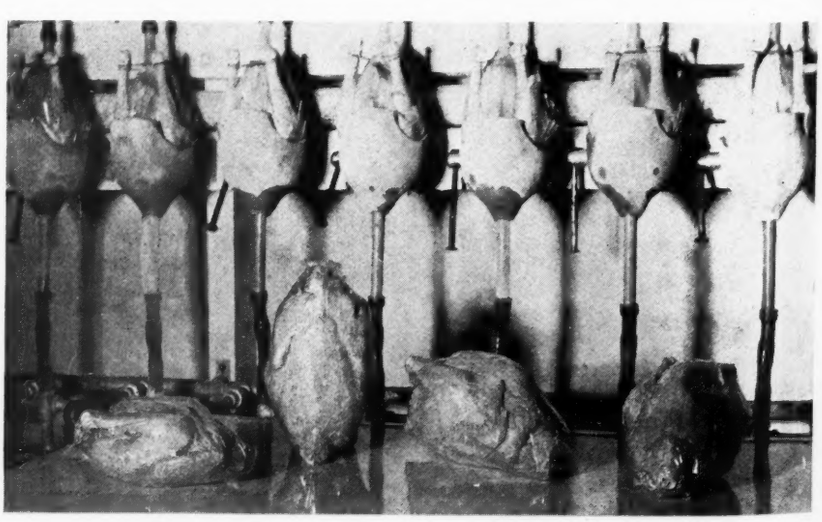
Considerable confusion of ideas has been caused by the use of the terms "quick freezing" and "frosted foods." When frozen foods were introduced, a method of describing them in new and disarming guise was necessary because the results of nature's freezing methods are too well known. Every one knows that after the first freeze each fall, those fruits and vegetables left above ground are rendered undesirable as food. A new terminology to replace "frozen foods" was necessary to allay any suspicions or prejudices against preserving foods by freezing.

Just what "quick freezing" is, has become difficult to define. Frozen foods designated by label as "quick frozen" may have been frozen in a few minutes or a number of hours. The first frozen fruits were cold-pack frozen after packing in barrels and 30-gal. tins, at a relatively slow freezing rate. This type of freezing has proved satisfactory for the industrial market. The requirements for the institutional market and retailer-household consumer market are different from that of the industrial market. Then, too, most foods other than fruits are not satisfactorily preserved by cold packing whether they are prepared for the industrial, institutional or household consumer trade. Most foods preserved by freezing for the institutional and household consumer trade will, therefore, be frozen by some adaptation of the many rapid freezing methods.

There is unquestionably a best freezing temperature for each variety of every item of perishable food. However, fundamentals of economics, as well as results from the research laboratory, will in the future determine the type of process, the speed of freezing and freezing temperatures. The cost of producing frozen foods of a quality which will command consumer preference is the factor which will dictate the variety selected, the process used and the temperature of freezing. Consumer preference, as used here, applies to the industrial and institutional users as well as to the household consumer. The demands of each, however, are different.

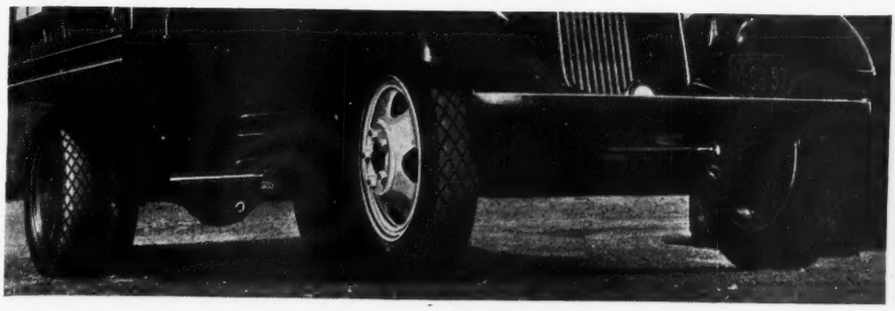
Many of those who have investigated most thoroughly the problem of freezing fruits and vegetables for the institutional and household consumer trade agree that at present the major problem is more an agricultural problem than a manufacturing problem. Only a few of the many varieties of peas, beans or strawberries produce satisfactory frozen products. These investigators believe that the selection and proper growing of fruits and vegetable varieties for freezing will bring to the market the quality of products which neither process, freezing temperature nor freezing speed alone can guarantee. They also believe that agricultural development will produce new varieties more suitable for preservation by freezing than existing varieties.

These facts lead to the belief that frozen food distribution will have an important determining effect on agriculture. It is not improbable that because certain fruits and vegetable varieties are most suitable for freezing, and because these varieties are best grown for frozen preservation in definite localities, that each fruit and vegetable area in the country will grow only those varieties for freezing best suited to that area.



The "Cridericed" process used by Progress Packing Co., Chamberburg, Pa. quick freezes 1½ lb. broilers from the inside out in 15 to 18 minutes at a temperature of 3 to 5 deg. F.

How to Get EXTRA MILES out of TIRES



Tips on selecting and servicing them

ALTHOUGH present-day tires are long-lived, they do wear out and require replacement. Suggestions on how to get the longest run for your money out of the tires you buy for your trucks and salesmen's cars are included in the following symposium.

Retreading Doubles Mileage

Our fleet consists of 24 ½-ton trucks and one 1½-ton truck. Twenty-three ½-ton trucks operate on house-to-house routes, with many starts and stops. The large truck covers shop cafeterias, school restaurants and the like, all over the city.

Tires on this large truck have always given good mileage, and with retreading the mileage was doubled. It pays to retread them.

Standard equipment on the ½-ton truck is the four-ply tire. It is unreliable. There is no absolute minimum mileage to be expected from it. Pressures of 35 to 40 lb. give better results than the standard 30 lb. However, results are uncertain.

The best results that we have obtained have come from heavy-duty casings. They give most mileage on the original tread, and also as good when retreaded.

All retread jobs, however, do not give the same results. The system whereby the retread band is one piece, and is stretched to fit over the casing, gives unreliable results. Very many of these retreads have fabric failures. The system whereby the new tread is put on in three pieces has shown uniformly good results, with no fabric failures. This retread job pays. In all cases, however, the casing must be good.

We check the air in the tires every time a truck is refueled—about two or three times per week. On Sunday night, when the fleet has been in the garage 24 hours, we check all tires for slow leaks. The man that dispenses gas and oil is responsible for air pressure in tires. He checks up when all the cars are in the garage.

We change tires from one wheel to another, but there is no special mileage at which this is done. Some routes have more stops than others, and show more wear on rear tires.

There is a new kind of heavy-duty tire available for our type of operation called "Stop and Start Tire." We have not had any in operation long enough at this time to give any definite information on them.—CHRISTIAN W. SCHMITT, *Town Talk Bakery, Inc., Rochester, N. Y.*

Checks Tires Regularly

We have always bought tires of a size based on the capacity load (maximum), and we find that heavy-duty, oversize tires give us the most economical service.

We have the tires on our motor vehicles checked regularly to avoid operation with them partially inflated. We change tires from one wheel to another, the frequency with which we do this depending upon the condition of the tires. We have never had tires regrooved or retreaded when they are worn smooth.—R. E. CHITTENDEN, *secretary-treasurer, Perfection Canning Co., Inc., Newark, N. Y.*

Doesn't Favor Retreading

In determining tire sizes, it is best to equip trucks with a tire capacity computed on the rate of the vehicle plus its load. The weight of the load used should be that of the maximum load and not the average load.

Distribution QUESTIONS CLUB

Standard-size tires do not give as economical and satisfactory service as do the oversize.

In regard to changing tires from one wheel to another after a certain mileage, we do not follow this practice. As for retreading tires, we have not had much success with tires reconditioned in that manner.—R. S. BROWN, *C. & B Canning Co., Snow Hill, Md.*

Likes Heavy-duty Tubes

For best results, it is advisable to equip trucks with a tire capacity figured on the basis of the total weight of the vehicle and its load, with the maximum load being considered.

We use four-, eight- or ten-ply casings, as the weight of the vehicle plus the load indicates, but we use heavy-duty tubes. To insure correct inflation of the tires, we check them every 1,000 miles. We do not change tires from one wheel to another after a certain mileage. When tires are worn smooth, it pays to retread them. —A. TAYLOR, *manager, Drake Dairy Products Co., Inc., Saratoga, N. Y.*

Oversized Tires Favored

Total weight of the truck and its maximum load should be used as the basis for computing tire capacity.

Oversize tires give the more economical and satisfactory service on trucks and commercial cars, and we believe that it pays to use heavy-duty casings and heavy-duty tubes. The steps that we take to insure proper tire inflation are those recommended by the manufacturers of the tires that we use. Tires should be changed from one wheel to another from time to time, so that the wear on them will be more uniform. When they are worn smooth, it does not pay to regroove or retread them.—W. O. WHEELER, *president, East Pembroke Canning Co., Batavia, N. Y.*

TRUCKS Keep Pace With Trends in Distribution

Large, centrally located bakeries, with their large sales areas now place new demands on truck operation

A NEW TYPE of motorized unit has been developed as the result of the baking industry's modern merchandising program of quantity production to obtain a low cost per loaf of bread. This has been secured by large, most efficiently equipped bakeries, centrally located in the sales area to be served.

In turn, this has required a larger sales area than before in order to market the increased output. And as the sales area was increased, it became more and more uneconomical to operate the most distant routes. Hence, the need for the new motorized unit. It is one of large volume and carrying capacity with a high road speed, since freshness is a prime requisite in bread sales. Its purpose is rapidly to transport large loads of bread to depots or branches on the outer fringes of the increased sales area, final deliveries being made by smaller route trucks.

Three examples of the new type—two tractor-trailer jobs and a cab-over-engine truck—are shown here-

The letters you see on this bread transport are 3 ft. high. The combination, which consists of a G.M.C. cab-over-engine tractor and a Fruehauf semi-trailer, is owned by the Metz Brothers Baking Co. and operated out of Sioux City, Iowa. The upper half of the paint job is white, the lower, blue.

How many loaves would you say this bread transport could carry? The answer is 8,000. Some idea of the body size may be had by comparison with the driver at the open side door. The unit is made up of a Fruehauf semi-trailer and a Ford cab-over-engine tractor. Both are painted white. They operate between Centralia and East St. Louis, Ill.

with. Two examples of the latest ideas in bakery route trucks also are shown.

The large-capacity bread vehicles are quite different from vans for carrying furniture and from the ordinary freight carriers in overland service. Because bread weighs less per cubic foot than does the average commercial freight, the bakery-truck bodies must be large. One shown in an accompanying illustration carries 8,000 loaves of bread.

The baker-to-branch bread transports must be able to maintain a high road speed. Bread made late one day must be moved to the depots in time for final sale beginning early the next day. And the truck and trailer bodies must be so constructed as to protect the load not only against rain and snow, but against dust and dirt, for sanitary reasons. Most of the bread transports are painted white or cream or a light gray or aluminum. Thus advantage is taken of the association of light colors with purity and cleanliness of the product in the minds of the public.

While the width and length of the vehicles are restricted by law in most states, the fact that they are painted a light color makes them appear larger than they really are. To minimize the public's dislike of extra large vehicles on the highways, two expedients have been resorted to, these being intended to offset the effect of light color and to disguise the large volumetric capacity necessary to carry the load.

The first of these expedients is to utilize a horizontal belt panel on the body. This tends to reduce the appearance of height. In some cases, as with one of the transports shown, that portion of the body below the belt panel is painted a darker shade. The effect of this is to further reduce the appearance of both height and length.

The use of large letters on the body sides has also been employed to make the body itself look lower and shorter.

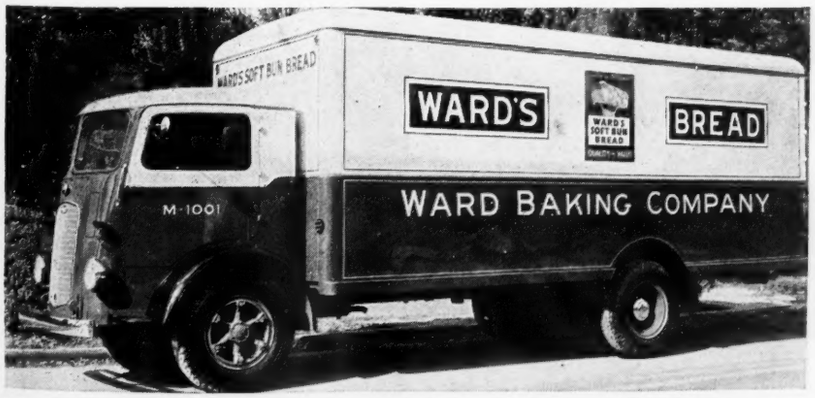
One of the trailers shown herewith has lettering 3 ft. high.

Still another trend noticeable in the newer bread transports is the use of cab-over-engine tractors with semi-trailer combinations. The use of such tractors in place of the older, engine-out-front tractors adds 2 or 3 ft. to the load length of the trailer body on the same overall length of tractor and trailer.

Of the two new route trucks shown, one is featured by Dry-Zero insulation and the elimination of rear doors to prevent dust penetration by suction action when the truck is in motion on country roads. The other features large body capacity on a short wheel base and a low step entrance with a straight-frame chassis.

One of the newest type of route truck, a White Merchandor model. It has the engine under the floor, a low step on a straight-frame chassis, a body capacity of 350 cu.ft. and an overall length of only 17 ft. It makes deliveries in St. Louis.

One of eight trucks operated out of Aberdeen, S. D., on routes averaging 175 miles. This Ward-Owsley Dodge has an insulated body with two side doors but no rear door. Pads of Dry-Zero 1½ in. thick maintain a body temperature of 70 deg. F. in all kinds of weather. The rear door was eliminated to prevent dust from entering the body by suction action as the truck travels over dusty country roads.



Down in Birmingham, this cab-over-engine Mack hauls a load of 490 cartons of bread on a route which averages 264 miles a day. Water and dust-proof, the body is mounted on steel outriggers to give a low loading floor.

New PACKAGES AND PRODUCTS

New Puffed Apple Product

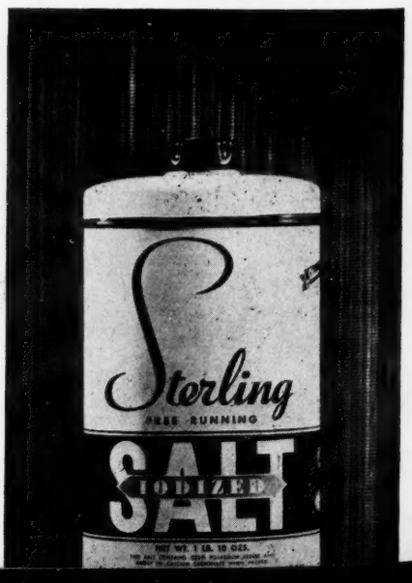
A NEW PUFFED APPLE PRODUCT "Appella Crisps," product of the Appella Corp., Seattle, comes to the market as a unique product in a unique container. Appella Crisps, dry crisp bits of apple, is suggested as a breakfast food, as the base for quickly preparing apple sauce, apple sauce cake and puddings, or alone as a dessert, served with cream. The product on exposure to air absorbs moisture which cannot be removed by heating in the oven. Even though the moisture laden product may be made into applesauce, it is advantageous to maintain it in crisp, dry form. The key-opened, sealed can is provided with a compression lid to form a tight seal and keep the product fresh after it has been opened by the consumer.

Carbonated Papaya Beverage

THE RECENTLY INTRODUCED Pa-Poya syrup, extract of the tropical fruit, papaya, has found an early application in the carbonated beverage industry. Amber-dry "Papale," product of Papaya Industries, Inc., Boston, a carbonated beverage made with Pa-Poya syrup and ginger extract, enters its bid for consumer acceptance as a mixer in drinks.

Salt in Metal Container

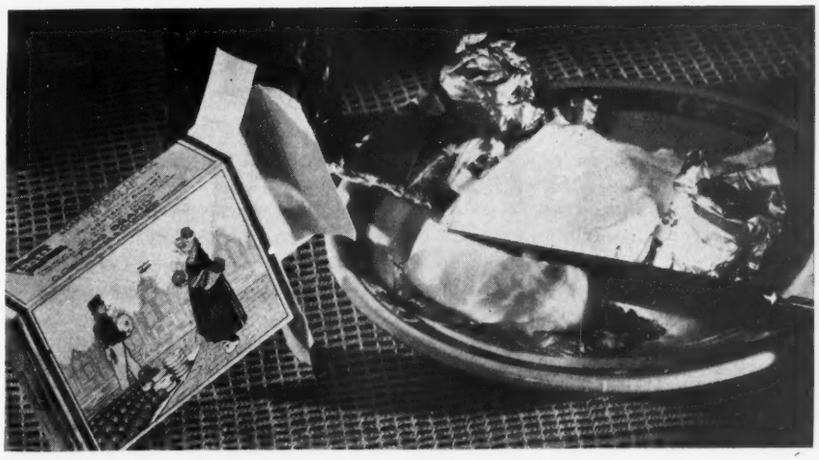
"STERLING" salt has recently made its appearance on the market in a gay, oval enameled metal container. This package was originally designed for the export trade. Shipping salt by water, especially to humid tropical climates, placed a demand upon the salt container too great for the original paper package. A container that protects salt in humid, tropical climates will also protect salt in this country in the damp areas around lakes and near the sea coast. Sterling salt, product of International Salt Co., Scranton, Pa., is now being offered to the domestic market. The package



Cashew Nuts Confection

CASHEW NUTS are now being processed into a confection distributed through grocery outlets in the better class neighborhoods in the East. "Spanuts" product of Summit Sweets, Inc., Jersey City, is packaged in a square paper can container with metal top and bottom and compression lid. This cashew nut crunch is suggested as a niblet for parties and functions.

is closed by a screw cap which when rotated brings in line a triangular slot in the top and metal surface below, from which the salt may be poured. Further rotation of the screw cap tightly seals the container. The new container has shelf appeal in keeping with the present-day trend to create packages which make a maximum bid for impulse sales.

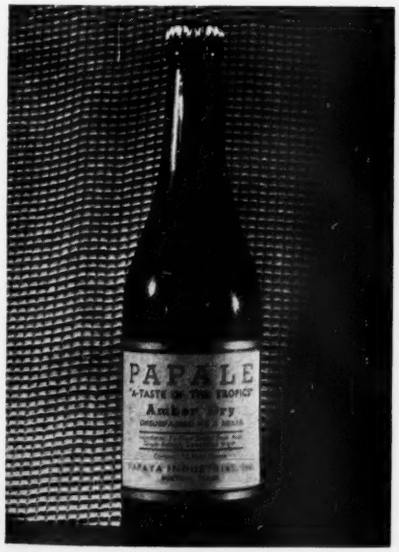


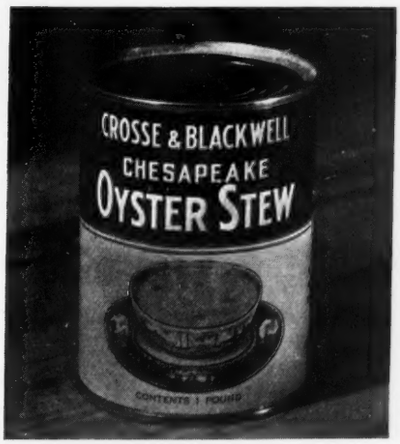
Spread from Edam

G. GRONDSMA & Co., Holland, manufacturers of the familiar red cannonball cheeses, is making a bid for a larger slice of the American market, the mass market, by offering an processed Edam cheese to spread. "Flag Brand" cheese spread, metal foil wrapped, in 6 oz. paper board containers, capitalizes on the acceptance built up for Edam cheese through use of colored illustrations of Edam cheese on the side of the package.

Novel Honeycomb Bar

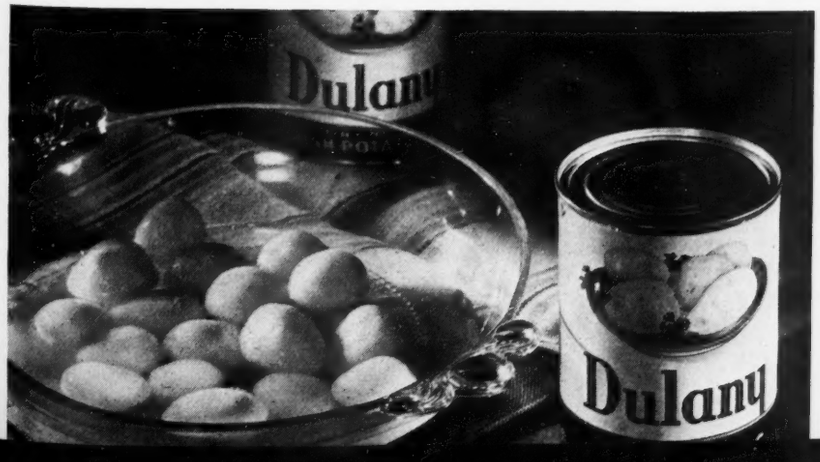
THE "AERO" milk chocolate bar recently introduced by Hershey Chocolate Co., Hershey, Pa., introduces a new feature in chocolate bars. This unusually large nickel chocolate bar has a honeycomb structure, which gives the product a crunchy quality not characteristic of the usual chocolate bar. The foil-wrapped bar is protected by an outer golden colored transparent wrap.





Debutante Stew

OF THE MANY SOUPS popular in this country, both in the home and restaurant, oyster stew is one of the last to reach the market in prepared form. "Chesapeake Oyster Stew" product of Crosse & Blackwell Co., Baltimore, has recently been placed on the market in 1-lb. cans.



Lowly Spud Glorified

TINY, NEW IRISH POTATOES, peeled, and ready-cooked, are the product of John H. Dulany & Sons, Fruitland, Md. This product may be used cold as it comes from the can, in the preparation of salads or for other potato dishes by warming. The processed product provides new potatoes throughout the year, with a minimum of effort necessary in making them into a table dish.

Merchandising HINTS AND HURDLES

A Vote of Thanks

THE U.S. Department of Commerce is to be congratulated on the address delivered by Harry R. Daniel of the Department, telling the story of the grain milling industry, over the Columbia Broadcasting System on Feb. 19. The food industries offer a vote of thanks. This type of presentation of facts by the Department of Commerce will do much to correct the warped thinking of many consumers, who have been greatly misguided and prejudiced by biased orators and publishers. Food manufacturers will welcome more of this kind of valuable aid from their department at Washington.

Cans Pioneer New Field

EVER SINCE CANS became an important factor in the distribution of consumer packaged beer, the can companies have had their eyes on the carbonated beverage field. Although up until now carbonated beverages have not appeared on the market in cans, ginger ale manufacturers, annoyed by the vexing problem of returns, have followed closely the development of and reactions to beer in cans. Early in March, Clicquot Club Co., Millis, Mass., conducted an experiment with ginger ale in cans in a store catering to a quality apartment hotel trade. Two interesting features of this ginger ale container are the concave bottom and the interlocking side seam which is reinforced with seven locks.

Milk War Findings May Help Manufacturers

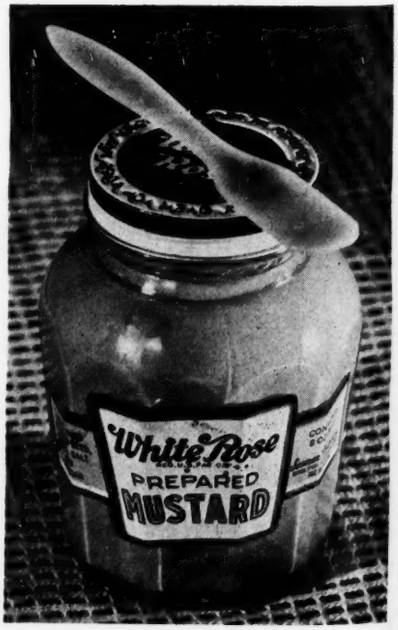
THE DRIVE by the administration of the City of New York to force down the retail price of milk has brought about a complicated situation with each faction concerned battling for its share of the pennies paid for each quart of milk. The milk situation in California is much the same as in New York. Producers want, for their butter fat content, a better portion of the consumer's dollar. Retailers and wholesalers are rebelling against any telescoping of their margins. Manufacturers are steadfast in their demand for their spread. Investigations are being conducted to obtain cost data on all operations performed in bringing milk from the cow to the consumer. Cost data will reveal a high cost for distribution as compared to the cost of processing.

Plastic Mustard Paddle

THE PLASTIC MUSTARD PADDLE used by Seeman Bros. Co., New York, as a premium with its "White Rose Prepared Mustard" threatens the familiar wooden paddle with obsolescence. These new plastic paddles, in a variety of colors, are attached to the bottle of mustard by an elastic band around the neck. The limber and washable colored paddles have eye appeal in the store; they also have a sanitary appeal in the home.

Packaged Whole Veal Carcass

ALL FOOD STAPLES and most semi-perishables are now sold through retail outlets in packaged form. Recently, even a few perishables have come to the market pre-packaged in consumer size units. Now whole carcasses of veal reach the retailer as a transparent - cellulose - wrapped package.



many consumers insist on buying veal only with the typical pink color of very fresh veal. This preferred color fades rapidly after the skin is removed from the carcass. The loss of the desirable pink color is the result of drying. Although various wrappings have been successfully used experimentally to preserve the color and protect the carcass from drying, they have not been commercially practical. Because these wrappings were not transparent, dealers were unable to see and judge the carcass. Armour & Co., Chicago, has recently solved this problem by wrapping veal carcasses in semi-moistureproof transparent cellulose which is wound on the carcass in 5½-in. overlapping strips. This new type of packaging has several advantages. It retards drying, preserves color, and permits dealer inspection. There is also an added advantage of eye-appeal when the carcass is hung in the retail store.

Submitted, But Not Passed

THE NEW Patman bill calling for a graduated federal excise tax on chain stores, if passed, would compel many chains to dissolve or go bankrupt. Twenty-five per cent of 1935 retail sales were made by chains. National prosperity cannot exist if any appreciable portion of this immense volume of national business becomes insolvent. It is the history of bankruptcy that most insolvencies not only threaten the solvency of creditors but competitors as well.

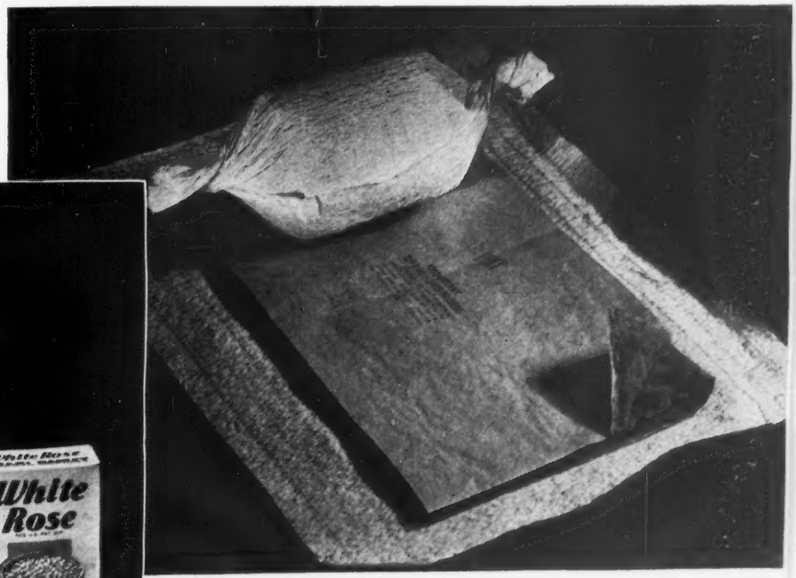
Earmarks of a Trend

ONE OF THE MANY SURPRISES which the supermarkets have given food manufacturers, distributors and their competitors, is their ability to move huge quantities of dried fruits, dried beans, peas, shredded coconut, cookies and candies, bought in bulk and packaged by the supermarket. Although price may have played an important part in moving this type of food, especially in the early years of supermarket operation, nevertheless, price alone has not always been the only responsible factor.

During the last year, especially, supermarkets have displayed greater and greater quantities and varieties of these foods, bought in bulk, and packaged by themselves in transparent wraps. The appeal of mass displays of such merchandise is undeniable. Many manufacturers and distributors who package such commodities have learned from the supermarkets and are now packaging either in trade branded, transparent bags or window boxes which plainly display the contents. White Rose brand of peas, beans, lentils, barley, etc., are now packaged by Seeman Bros. Co., New York City, in transparent window boxes.

Insulated Frozen Foods Wrap

EXPANSION of the frozen food market will bring about new adaptations for old packages and packaging materials as well as stimulate the development of new containers and new packaging materials. Insulated wrapping materials for maintaining the frozen state of foods in transit from the retailer to the home have already made their appearance on the market. "Vac Wrap", product of Vac Wrap Co., Roxbury, Mass., is one of these novel insulated wraps for frozen food packages. Insulating felt between paper sheets is attached to a larger sheet of tough crepe paper. When a carton of ice cream or frozen food is wrapped in Vac Wrap and the protruding ends twisted the carton sides and ends are surrounded by insulating material. Twisting the ends of the crepe paper is sufficient to fasten and secure the paper, which is lined on both sides with latex.



New DISCOVERIES AND INVENTIONS

FOOD ENGINEERING

Hoveman Method of Quick Freezing

IN A NOVEL SYSTEM for preserving meats, or other perishable foods, or animal organs for medicinal use, the product is encased in a closely fitting, flexible membrane of rubber, rubberized fabric, cellophane or the like, which is evacuated to make sure of a close, tight fit. After sealing this sheath air-tight, the product is sprayed with a refrigerant, and frozen. The flexible sheath protects the material thoroughly from exposure to air and from contamination of any kind. As an alternative, the encased product may be dipped in a refrigerating medium until frozen.

If it is desired to facilitate the transfer of heat from the meat or foodstuff through the sheath to the refrigerant, a metal salt or other material which has high heat-conductivity may be incorporated in the material of which the sheath is made. As the invention is described in British Patent 471,638 (granted Oct. 8, 1937, to John A. C. A. Hoveman of Paris, France), it offers an economical means for preserving package products and special goods by refrigeration, in thoroughly sanitary condition and in convenient form for handling.

(See also "Tests on Quick Freezing Applied to Large Cuts of Meat," by Maurice Piettre, FOOD INDUSTRIES, 9, 646, 1937—Ed.)

New Sterilizing Filter For Beverages

A FILTER for sterilizing heat-sensitive liquids at low or moderate temperatures is especially applicable to fermented and unfermented beverages such as wine, beer and fruit juices. As the process is described in German Patent 652,711 (granted Nov. 5, 1937, to Edmond Bredo-Weustenraad of Brussels, Belgium), the liquid to be sterilized is filtered through a series of perforated membranes with progressively decreasing pore size, such that the micro-organisms are retained by the filter. The membranes are made by coating a fabric with cellulose acetate (or other cellulose ester), and are perforated with calibrated needles. For pore sizes smaller than the holes made by the needles, the perforated membrane is again coated (one or more times as needed) with the cellulose ester. The filter is supported by a backing plate which bears on its face fine circular or spiral grooves, with drain holes in the grooves to facilitate the escape of the filtrate. Beverages sterilized in this filter retain their esthetic qualities (freshness, flavor, sparkle and other properties), avoiding the unfavorable effects of heat sterilization.

BAKING

Sugar Particle Size: Its Effect on Cake Making

CONTROL OF SUGAR is a very important factor in standardizing cake baking. Best results are obtained when sugar is granulated and when the particles sizes are kept as uniform as practicable.

The effect of sugar granulation is well exemplified by tests on pound cakes with eight commercial sugars varying in size from very coarse to 6X confectioners. Creaming and dough and loaf volumes were poor with very coarse sugars and improved as the granulations became finer, as long as the sugar remained crystalline. But when the sugar was pulverized and no longer crystalline, then the cake making properties fell off rapidly.

The importance of granulation suggests the need for its control. The most simple and effective means of control has been found in screening the sugar before use. For instance, in the case of fruit powdered sugar, practical tests show that passing it through a 30-mesh screen prior to use is sufficient to keep the size variation as uniform as the control requires.

The following table of granulation specifications is reproduced from the article:

Digest from "Factor Control in Cake Baking," by J. A. Dunn and J. R. White, *Cereal Chemistry*, 14, 783 1937.

Sugar Granulation Specifications

Grade	Topping sugar	Common granulations			Cake sugar		Standard powdered	Powdered grades	
	Standard medium "O" or "A"	Medium	Fine	Extra fine	Fruit fine	Fruit powdered		4X	6X
	%	%	%	%	%	%	%	%	%
10 mesh...	.....	0.9	.....	.....	.....	.....	.....	.....	.....
14 mesh...	40	2.0	.....	.....	.....	.....	.....	.....	.....
20 mesh...	60	13.0	.....	.....	.....	.....	.....	.....	.....
28 mesh...	.....	.....	7	.....	.....	.....	.....	.....	.....
35 mesh...	.....	66.0	55	8	3	0.4	.....	.....	.....
48 mesh...	.....	17 (1%)[1]	20	25	18	8.4	.....	.....	.....
65 mesh...	.....	.....	9	30	35	27.3	25	.....	.....
100 mesh...	.....	.....	5 (4%)[1]	25 (12%)[1]	29 (15%)[1]	44.6 (19.3%)[1]	17 (57%)	2	1
150 mesh...	.....	.....	.....	.....	.....	.....	.....	4	2
200 mesh...	.....	.....	.....	.....	.....	.....	.....	12 (82%)[1]	6 (91%)[1]
Estimated proportion of total U.S. sugar consumption by grades	0.6	7.5	8.1	67.9	10.1	0.05	0.14	4X plus 6X taken together 5.37%	

[1] "Throughs" shown in parenthesis

Bread Made With Bacteria-Yeast Leaven

IMPROVED FLAVOR, lower fermentation losses, better keeping quality and higher resistance to staling are properties claimed for bread made by the process revealed in U.S. Patent No. 2,104,054 compared with bread made by the usual yeast fermentation methods.

This patented method provides for

(*Turn to page* 228)

The PLANT NOTEBOOK

Steam Required to Can Peas

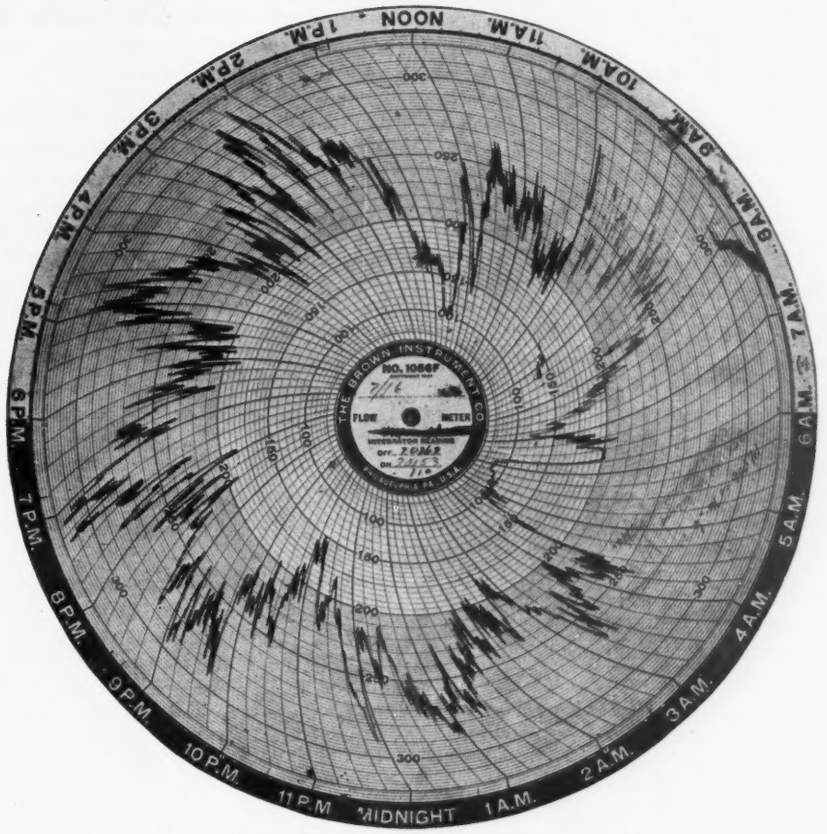
What are the steam requirements of a modern pea canning plant? The question can be answered for one plant by reference to the accompanying steam flow meter chart, when data as to output are also known.

This chart shows the pounds of steam actually generated in the boilers of a 7-line pea canning plant for one normal operating day during the packing season. The steam load was highly fluctuating, as the flow of peas from the fields was not steady and there were frequent shutdowns necessary to keep the equipment in proper sanitary condition.

Operating data for the day covered by the chart were as follows:

Maximum possible output, cases of 24 No. 2 cans	24,000
Actual output, cases of 24 No. 2 cans	14,806
Actual output, in cans	355,344
Closing lines in service	7
Retorts in service	30
Coal burned, tons (12,000 B.t.u. per lb.)	31.2
Rated boiler horsepower in service	620
Maximum instantaneous boiler horsepower developed	970
Steam pressure developed, lb	140
Steam generated, from flow chart, lb.	495,000
Steam used per case of peas produced, lb.	33.43
Steam used per can of peas produced, lb.	1.39

—S. H. COLEMAN. *Roanoke, Va.*



Sample steam flow chart from pea canning plant.

Scaffolds Must Be Safe

In carrying out maintenance work and repairs around the food plant, it is often necessary to have scaffolds, in order to work at a height above the floor. When such scaffolds are not constructed and erected in accordance with the requirements of safety, they are often the cause of serious and fatal accidents.

All materials used in building scaffolds should be sound and free from defects. Scaffolds should be constructed with strength more than ample to carry the load to which they will be subjected.

Other rules to observe in avoiding accidents in the use of scaffolds are:

(*a*) Provide safe means of access. Ladders should be fastened. Stairways are preferable.

(*b*) Have sufficient working space to allow free movement.

(*c*) Allow sufficient headroom.

(*d*) Guard edges by railings and toe-boards. Wire mesh screens at sides will prevent tools from falling and causing injuries.

(*e*) Be sure scaffolds rest upon adequate foundations and are erected in a stable manner.

(*f*) Allow only selected employees to work on scaffolds—those who can work at a height without growing dizzy, who have good judgment and some practical rigging sense.

(*g*) Inspect scaffolds regularly and maintain in safe condition throughout period of use.

To avoid falls when working on scaffolds, the worker should keep hands free to grip the rails when using stairs or ladders. He should wear good shoes, keep the laces tied, and take short steps in slippery places. Baggy turn-ups on overalls or cuffs on trousers should be avoided. The platform should be kept clear of objects that might prove to be stumbling blocks.—*Source of information, Safe Practices Pamphlet No. 12, National Safety Council.*

Short-Center Drive Efficiency

The short-center drive was once practical only if and when a chain drive of some kind could be used. Admittedly, various types of chain drives are highly efficient and well worthy of consideration wherever the short drive is called for. As touching places where it is in demand, it seems that throughout industry there is a continually increasing demand for really efficient short-center drives. Doubtless one reason for this is simply a better realization of the value of floor space, and the fact that a short-center drive does not occupy so much of it. On the other hand, machine designers are also coming to realize that when a very short-centered drive may be used, quite often the motor and the drive may be mounted directly upon the machine base or frame, thus allowing it to be made as a self-contained unit.

Belt drives that have come to the front as efficient for short-center work of late years include the V-belt type and the flat-belt, pivoted motor type. With multiple V-belts, some plants have standardized as much as possible on some standard length of V-belt, arranging all new motor installations, as far as possible, to use that same length. The advantage is that by keeping just a few belts of that kind and

length on hand, replacements are at hand to fit any one of the drives so standardized. This gives ample protection for the drives and yet reduces the belt inventory to a much lower figure than if all drives were different.

The reason that a pivoted-motor layout will allow a flat-belt to be used efficiently for a short-center drive is that there is an automatic take-up for any stretch that may occur in the belt at any time for any reason whatever. Just as soon as any stretch occurs, the motor swings around its pivot, and takes up the slack formed. As a natural result there is constant tension maintained in the belt at all times and it grips the pulleys as well at one time as at another.

Not all of the advantage of V-belt or of pivoted-motor drives lies in the fact that they are more efficient in the delivery of power. A great part of it lies in lower maintenance. The continual shifting of a motor to and fro on its base, or the continual cutting and re-lacing of belts, is very largely a thing of the past where drives of this kind are used. Doubtless there will be others just as good available in the near future, but these are a very good start in the right direction.—JOHN E. HYLER, *Peoria, Ill.*

Portable Table Aids Packaging Operations

Nothing can beat a long, mobile table with a belt conveyor mounted on it, when it comes to handling the output of an ice cream package machine, or a crispy bar machine, or any other production machine of a similar nature, so that the product is properly distributed for wrapping.

In the photograph is shown such a table that we constructed in our plant. It is built with strong 4x4-in. wooden legs, well braced with iron, and rides on heavy casters. Heavy screen door hooks attach it to the machine which it is serving, but it can be quickly detached and moved to another location.

On a shelf, underneath, at one end, is a ⅓ hp. motor, of 1,140 r.p.m., wired for 110 volts, which drives a small 40 to 1 worm gear speed reducer through a single V-belt pulley, 3¾ and 7½ in. in diameter. From the reducer to the belt shaft there is another reduction through 3 and 8 in. diameter pulleys, of the twin V-belt type. The carrier belt of this conveyor is 5 in. wide and rides over the upper surface of the table, carrying the product to the girls who do the wrapping, as shown in the picture. This belt turn on 5½x6 in. pulleys attached at either end of the table. The return run of the belt is beneath the table.—BILLIE BURGAN, *San Diego, Calif.*

Air Compressor Economy

With the use of compressed air continually on the increase for various types of service, more attention is being given in many plants to using it with economy. Plants which have had in the past but one compressor, which they considered adequate for their needs, are now, in many cases, being converted into two-compressor layouts. Where two compressors are available, it is easy to adjust output to suit demand without much cutting of compressors into and out of service. It is, of course, true that with a reliable pressure switch the output can be governed with a single compressor, but not with true economy of power consumption.

Consider an installation in a plant where it is estimated that the peak load will run around 1,200 cu.ft. per minute. This load is present for only a short period or two during the entire day, yet it is necessary to have the capacity to produce it. Now, if there are two compressors, one of which is rated at around 800 cu.ft. per minute, and the other about 400 cu.ft. per minute there will be the needed peak capacity with both machines in service. When the load is lighter, one of the machines only will serve and the size of the load will decide which to use. This allows the compressors to operate at a point somewhere near their rated capacities, which gives the most in economy.

Also, there is certainly a very great maintenance advantage in having two compressors available instead of one, so that the plant is not without air while service repairs are being made.—JOHN E. HYLER, *Peoria, Ill.*

Boiler Continuous Blow-Down

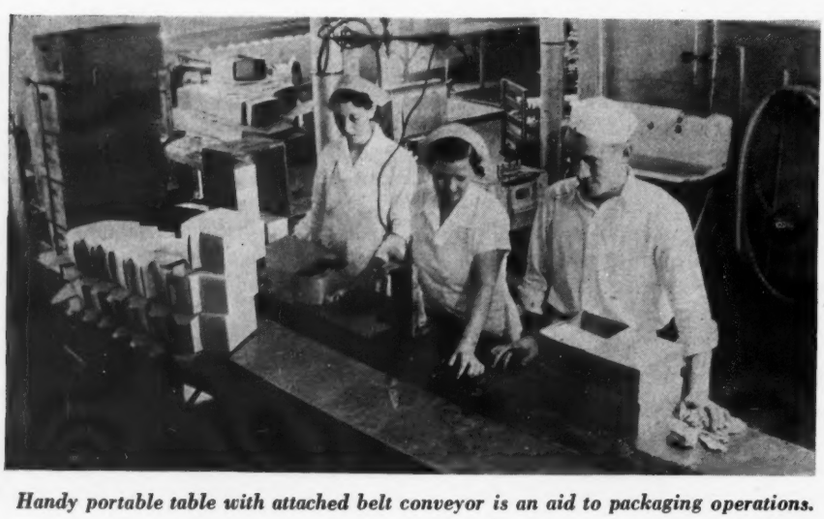
Referring to the article by N. T. Pef in FOOD INDUSTRIES, September, 1937, page 526, there is one important method of continuous blow-down that was not mentioned. In fact, it is a method that I have never seen mentioned in any article. It consists of continuous blow-down through a modern type of boiler feedwater regulator.

The regulator that I have in mind operates from the water column of the boiler where the water is comparatively quiescent, and consequently where concentration is likely to be higher than elsewhere in the boiler. This regulator depends upon continuous blow-down for its successful operation. It combines the advantages of continuous blow-down with the advantages of continuous regulation of water level.

Tests were recently conducted by the New York Testing Laboratories comparing water going into a boiler with the water continuously discharged through the boiler feed regulator. The report of these tests shows that the discharge water contained 8.3 times the concentration of the water injected into the boiler.

The discharge water passes through orifices in the regulating element—orifices that to the eye seem to be small. But use of this type of regulation over a period of several years in many boilers has demonstrated that the method of regulation is reliable. There has not yet been one case of serious stoppage caused by clogging. Where it is desired to step up the quantity of discharge, the orifice diameters are increased in proper ratio to each other.

By returning the blow-off to a heat interchanger, as is commonly done with other arrangements of continuous blow-off, the heat in the blow-off water from the regulator it utilized.—W. F. SCHAPHORST, *Newark, N. J.*



Handy portable table with attached belt conveyor is an aid to packaging operations.

Food Equipment News

REVIEW OF FOOD PROCESSING EQUIPMENT, ACCESSORIES, AND SUPPLIES

Automatic Weigher-Filler

B. F. GUMP Co., Chicago, Ill., has brought out the "Bar-Nun Auto-Check" net and gross weigher, for accurately weighing out granular, powdered or flaked materials and filling them into bags, cartons, envelopes or glass containers. The makers claim that this weigher is so accurate that the average commercial balance can detect no variation in the weight of the filled packages, which are filled with a guaranteed maximum variation of $\frac{1}{16}$ oz., plus or minus.

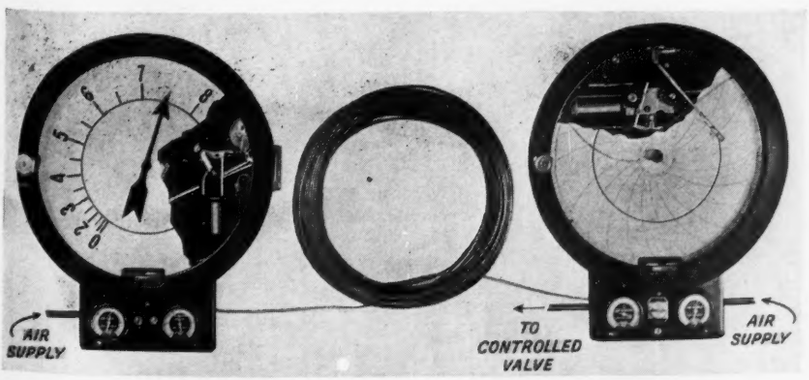
This machine weighs, check-weighs and fills automatically. One operator can average 18 to 25 completed packages per minute—feeding the bags into the bag opener, removing the filled bags, closing and stapling. Maximum capacity of the machine is 30 dischargers per minute, while range is from $\frac{1}{4}$ oz. to $\frac{1}{2}$ lb.

Automatic weigher-filler for bags, cartons, envelopes or glass containers.

Remote Control System

BROWN INSTRUMENT Co., Philadelphia, Pa., has developed a pneumatic system for remote measurement with air-operated control. This system is designed primarily for remote measurement of process variables in atmospheres containing explosive gases or dusts, where electrical measurement is not permissible.

The system consists essentially of a transmitting indicating instrument that is installed at the point of operation, and a receiver, which may be either indicating or recording, located at a remote control board. The remote transmission unit is a balanced air pilot, mechanically actuated, built into the indicating transmitter.



Remote control system. At left, the indicating flow transmitter. At center, the transmission tubing. At right, the recording and controlling receiver.

Cut-Off for Scales

A SENSITIVE electric cut-off attachment that can be used with any dial scale, for the purpose of high speed proportioning, has been developed by The Howe Scale Co., Rutland, Vt. This attachment can be used to open or shut hoppers, batching equipment, control valves, or other equipment used in the operation of weighing materials.

The principle of operation makes use of the reflection of a beam of light. The optical unit, mounted on the front of the scale dial by means of vacuum cups, is of the "electric eye" type, containing a photocell and a small incandescent lamp. Cut-off is effected when the beam of light from the lamp, reflected from the dial onto the photo-cell, is interrupted by the passage of the dial arrow.

Several of these units can be used on the same dial to obtain combinations and sequence of control. For instance, one unit can be set for dribble, while another is set for complete cut-off. The unit is adjustable over the full 360 degrees of the dial.

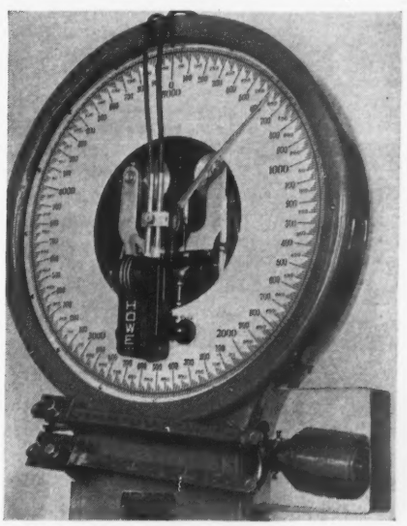


Photo-electric cut-off for scales.

The relay unit, electrically-connected to the optical unit, as shown in the accompanying illustration, is usually mounted on the rear of the scale. Pilot lights on top of this unit indicate when relay contacts are open or closed.

Traveling Tray Ovens

READ MACHINERY Co., Inc., York, Pa., recently introduced a complete line of "Hydro-Turbulated" traveling

tray ovens, with the feature of controlled moisture within the baking space. These ovens are built for multi-cycle operation, in rated capacities from 600 to 1,350 lb. of dough per hour, and for single-cycle operation, in rated capacities from 1,142 lb. of dough per hour and up.

The manufacturer states that these new ovens provide absolute control of steam saturation, with injection of both wet and dry steam, and with even heat distribution.

Electric Drills

SYNTRON Co., Homer City, Pa., has brought out a complete new line of electric drills, of which the ½ in. size is shown here. These tools have been

Portable electric drill

designed for maintenance work, as well as for production line and construction work. They are equipped with universal motors and are of sturdy construction. Corners are rounded off, so as not to catch in the operator's clothing.

Stainless Steel Faced Sheet

A FLEXIBLE STEEL SHEET PRODUCT, made up of a thin stainless steel sheet with a flexible backing similar to roofing felt, has been made available by Ludlum Steel Co., Watervliet, N. Y. This material is called "Ludlite." It can be nailed, screwed or cemented in place, can be cut with heavy scissors, and can easily be bent to any desired shape. The stainless steel surface is corrosion and tarnish proof and the backing is waterproof, flexible and sound deadening. Steel and backing are heat cemented under pressure, forming a permanent bond.

"Ludlite" is primarily for decorative purposes, but can also be used for light industrial purposes, such as for tops of sorting tables. It comes in rolls 2 ft. wide and 50 ft. or 100 ft. long, also in 4 in. square tiles.

Pop Wrapping Machine

A NEW POP WRAPPER, Model LP-2, has been brought out by Package Machinery Co., Springfield, Mass. This machine has an output of 110 to 120 per minute and is designed to wrap rectangular, cylindrical, oval, pear-shaped or ball-shaped pops. It is said to make a saving in wrapping material as compared to previous designs, and to produce a neater, more attractive package.

In operation, the pop, on entering the machine, trips the paper feed and carries the wrapper with it into the carrier chain. This chain grips the pop firmly by the head, clamping the wrapper to the pop and holding it in position until folding and twisting are completed. This method is said to give uniform folds in the wrapper, and to require less under-lap, thus saving material. The last fold and twist are heat-sealed.

Convertible Gas-Diesel Engine

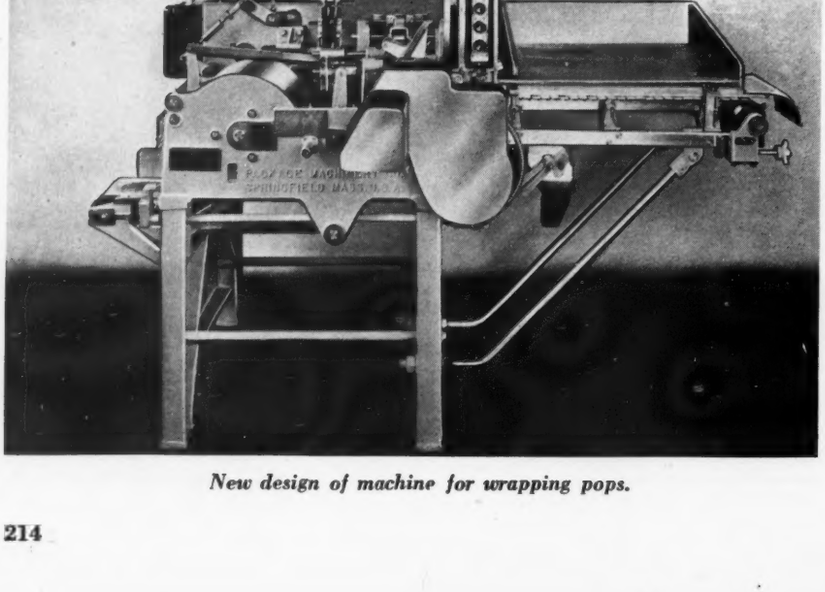
FAIRBANKS, MORSE & Co., 600 So. Michigan Ave., Chicago, Ill., has brought out a line of four-cycle convertible diesel-gas engines. These are medium speed engines in the 200- to 300-hp. range for stationery power service or for electricity generation. Engines are designated as Model 36-A-8.

Sandwich Filling Machine

A NEW TYPE of bench model sandwich filling machine for cracker bakers has been developed by Frazier & Son., 7 Bremond St., Belleville, N. J. It is designed to handle peanut butter or other fillings of similar consistency.

In operation, an even ribbon of the filling is forced continuously from the discharge spout by means of a worm feed in the conical hopper. The operator moves each cracker across the bottom of the discharge spout, cutting off the end of the ribbon just inside the end of the cracker. Discharge spouts can be furnished to give a wide variety of widths and thicknesses of ribbon.

The speed of discharge is controlled by the valve lever at the right, and varies from 48 crackers per minute upward, depending on the operator.



New design of machine for wrapping pops.

Sandwich filling machine

General News—Business Trends—Men, Jobs and Companies

Process Taxes Planned On Wheat, Rice, Cotton

Processing taxes on three products of basic importance in the food industries apparently are in the offing. Flour millers, bakers, rice millers, cottonseed oil processors and oleomargarine manufacturers will be affected. To raise $200,000,000 annually to be used in crop-control financing, Senator Pope (Idaho) has prepared legislation embodying processing taxes on wheat, rice and cotton. The funds produced by these taxes would supplement $500,000,000 already appropriated for the soil-conservation program.

The proposed tax on wheat is graduated according to the type and weight of flour produced. The manufacture of whole-wheat flour would be taxed at 0.333 cents per pound, while on other flours, including semolina and farina, the levy would be 0.469 cents. Processing of prepared flours—cake, doughnut, pancake and the like—would be assessed at a rate ranging from 0.267 to 0.469 cents.

A graduated tax also is contemplated for cotton goods, and its effect in the food field would be to increase the cost of cottonseed oil and the cost of certain types of containers. Even without a tax, an appreciable boost in the cost of cottonseed is expected as a result of the 40 per cent reduction in supply to be effected by the cotton control program.

House Acts on Food Bill; Early Passage Expected

With the removal of the advertising snag which has held up Food & Drug Administration so long, clear sailing for Senator Copeland's S.5 seemed assured. Then the picture was blurred by the interjection of the section providing for stringent licensing of drugs. But even with that section in the measure as approved by the House committee, the prospect for passage of the legislation and its final approval by the President is regarded as rosy.

The medical profession, as a whole, however, is not pleased with the drug licensing plan, and charges are being freely made that such a proposal would erect a hurdle in the path of the development of new drugs.

Removal of the advertising section and transfer of advertising control from F&DA to FTC was effected March 14 by the Senate, and this poured oil on the troubled legislative waters. It did not, however, remove all rough spots from the path of the measure. The increased authority over labeling, given by the committee draft to F&DA, stirred some rancor. This feature of the bill is bound up with the provisions making the Secretary of Agriculture virtual dictator over all food and drug standards. In this respect the committee draft broke away from the provisions written into the measure by Senator Copeland.

The bill as it reached the House tended to compel closer cooperation between the FTC and F&DA, with the scientific aspects handled by the latter and the more practical phases of administration left in the hands of the former.

ROGER BRANDENBURG
Named president of engineers

Polish Hams To Be Taxed

Polish hams will not be able to compete in the domestic market with the products of American meat packers if the 6 cent excise tax passed by the House becomes law. Included in the general tax bill, this tax applies to imported pork products, and was passed to block a deal in which Poland was proposing to barter hams for cotton. The intention was to pay for 100,000 bales of cotton in this way. Added to the 3¼ cent duty levied in the tariff act, the new tax closes the door to Polish hams.

Engineers Talk Shop At Bakery Convention

Combining visual with verbal presentations, bakery production men discussed practical problems at the meeting of American Society of Bakery Engineers, March 14-17. They touched upon factors affecting bread consumption, practices influencing bakery goods quality, accident prevention, personnel building, plant layout, air conditioning, equipment operations, packaging of sweet goods and merchandising as it is related to production.

Meeting-place accommodations were taxed to the limit to provide seats for the 1,000 registrants—a new all-time registration record. Interest, as measured by session attendance, was greatest when bread quality and bakeshop practice were discussed.

In the joint session of the bakery engineers and cereal chemists, Dr. Oscar Skovholt, Quality Bakers of America, and Raymond T. Bohn, Great Atlantic & Pacific Tea Co., gave a dialogue presentation on "The Value of the Laboratory to the Baker." They dealt with evaluation of flours as to baking qualities on the basis of ash content, color, fineness, moisture content, protein content and quality, and absorption or "yield." They also discussed baking versus mechanical tests for determining the bread-making properties of flour.

Under the chairmanship of M. A. Gray, Pillsbury Flour Mills, the committee on bread consumption reported results of studies on sponge and dough temperatures, mechanical treatment of doughs, pan sizes and cleaning, and slice thickness in relation to eating qualities of bread. Particular emphasis was put on the effect of pan sizes. And the effect of standardization of pan sizes by the three Pacific Northwest states was seen as being for the betterment of eating qualities of bread, and for the economic improvement of the bread-baking industry. For 1-lb. loaves, the size of the standardized pans is: 9 in. long, 4½ in. wide, 2¾ in. deep. For 1½-lb. loaves, the length is 10½ in.

Roger Brandenburg, Michigan Bakeries, Inc., Grand Rapids, Mich., was elected president of A.S.B.E. Other officers are Wm. A. Hauck, Hauck Bakery, St. Louis, first vice-president; P. E. Minton, Nulomoline Co., Chicago, second vice-president; Victor E. Marx, *Bakers' Helper*, Chicago, secretary (re-elected).

Pointers on Packaging Given at Convention

Increased interest in packaging problems is evidenced by the 15 per cent increase in attendance over 1937 at the Eighth Packaging Conference and Exposition, held in Chicago, March 22-25. And further evidence of progress in packaging comes from the formation of a Packaging Production Men's Association, based on the use of automatic packaging operations in the plants of the members.

Heading up this new association, which has 61 members, is Wm. M. Bristol, Jr., Bristol-Meyers Co., Hillside, N. J. T. E. Charlton, *Glass Packer*, New York, is the secretary.

Speaking on informative labeling, Mrs. Carol Moffett, New York, made the point that the consumer needs on the label all the facts which indicate the real worth of the product. She said that the housewife had become a "purchasing agent" for her family.

That the cost of selling packaged groceries is less than the cost of selling unpackaged perishables was a fact emphasized by Ivan C. Miller, distribution editor of FOOD INDUSTRIES. The actual cost of selling fresh meat averages about 35 per cent above the cost of selling packaged groceries, he said.

In the all-day clinic on shipping containers, it was revealed that a saving of $250,000 a year, over a period of four years, has accrued to Standard Brands, Inc., New York, through the use of multiwall paper bags as shipping containers for ground and unground coffees.

Winner of the Wolf Award, presented at the exposition, was the Hoover Co.'s entry.

Wine Consumption Sets Record, Vintners Told

While assembled at the annual convention of the Wine Institute, held at San Francisco recently, California vintners heard a bit of gratifying news. They were told that wine consumption in America reached the all-time high of 65,100,000 gal. in 1937. This consumption, which tops by a large margin, the 60,400,000 gal. consumption in 1936, results from a three-year campaign to place wine on the American dinner table.

Expressed in gallons per capita, the 1937 wine consumption was not a record, being 0.504 as compared with 0.568 in 1914-15. California, which produced 88 per cent of the wine drank in this country last year (6 per cent was imported and 6 per cent produced in other states), demonstrated strong support for its local industry with a per capita wine consumption of 3.313 gal. This is more than twice the per capita consumption in the next highest state, is Louisiana, where the figure was 1.577 gal.

Americans continue to show a preference for sweet wines, consuming about two gallons of this type to one of dry wine. The latter, however, gained substantially last year.

Also reported at the convention was the fact that, for the first time since repeal, there is now enough wine on hand in California to insure adequate stocks for aging. Inventories on Dec. 31, 1937, totaled 113,221,000 gal.

CONVENTIONS

APRIL

12—California Frozen Pack Conference, Empire Hotel, San Francisco, Calif.
12–14—Pacific Northwest Bakers' Conference, Multnomah Hotel, Portland, Ore.
25–27—Fourth Annual Chemurgic Conference, Omaha, Neb.
27—American Corn Millers' Federation, Chase Hotel, St. Louis, Mo.
28–29—Millers National Federation, St. Louis.

MAY

15–17—New England Bakers' Association, New Ocean House, Swampscott, Mass.
27–28—Rice Millers' Association, Galvez Hotel, Galveston, Texas.
—American Association of Cereal Chemists, Cincinnati.

Stokely To Quick-freeze Honor Brand Products

With the announcement by Honor Brand Frosted Foods Corp. that Stokely Bros. & Co. will become the principal supplier of Honor Brand frosted fruits and vegetables, another important company has entered the frozen food industry. The Indianapolis canning company, which has expanded rapidly during the past ten years, owns and operates 34 plants located throughout the United States. More than 100,000 acres of fruits and vegetables are controlled by it. Six modern quick-freezing plants are being put into operation in as many growing areas of the company.

In this corporation tieup, Honor Brand has acquired new working capital of $350,000 for business expansion, while Stokely has obtained a minority stock interest in Honor Brand. Honor Brand also is making arrangements with leading producers of meats, poultry and fish, which will complete the line.

Adolf Gobel, Inc., is not now freezing meat for Honor Brand, but is distributing through its own outlets.

CAPITAL VIEWS

FOOD TAXES—Late in the present session there is going to be a violent effort to put over processing taxes, at least on wheat and cotton. If that much of the camel gets into the legislative tent, the rest of the food raw materials are likely to be similarly burdened in subsequent years. Budget unbalance grows monthly more serious. The Administration sees these processing taxes as the most hopeful escape from politically staggering deficits. The refusal of the House of Representatives immediately to approve heavy surtaxes on family-owned enterprises shows that the Executive is going to have trouble in all tax planning. This trouble may defeat processing taxes this year; but they are not dead.

FOOD EXPORTS—Continuing trade agreement negotiations by the State Department are stimulating our foreign processed-food markets, as well as the chance to sell the unprocessed products of agriculture. A recent setback was the notice from Nicaragua that it had to cancel tariff benefits granted the United States a year ago in order to meet budgetary contingencies; a variety of processed foods will suffer. Congress gave the Secretary of Commerce a million dollars with which to study and develop new foreign outlets. Thus the spirit of Congress and the Executive is willing, but the markets remain weak. Much more promising are the proposed new laboratories intended to develop by scientific research new methods for processing the surpluses from agriculture into non-food applications. Food manufacturers will want to get in on these by-product activities; they may profit by them.

LEGISLATION—Congress wants to go home. And even the reformers know that little wanted legislation can be had when the members are worried about political fences in their districts. There may be a face-saving labor bill, fixing wage-hour standards. But there is almost no chance that Government reorganization, anti-monopoly laws, or other wanted "reforms" will pass. Previously abandoned was regional planning. In doubt are food and drug law, stream-pollution legislation, and further merchandising control (anti-chain) measures. Practically the only certainties are appropriation bills, tax-law revision and naval expansion.

CAN-SIZE LAW—Only cans of standard sizes defined by federal law would be permissible if Congress should enact a bill which originated from the enthusiasm of Wisconsin weights and measures inspectors. Fortunately, Congress is not likely to do this. But this measure may accelerate needed reconsideration of further size standardization.

SULFANILAMIDE—The requirement that any new drug be licensed by the Department of Agriculture before interstate sales begin was recommended by the Department of Agriculture some months ago, an aftermath of the sulfanilamide elixir tragedies. The House subcommittee has added this idea to its bill. This may kill the whole law this Congress. One more controversial feature would stop most anything in Congress under present conditions.

PATENT RIGHTS—The President says that patents create monopolies, and implies that this is very wicked. As a part of the anti-monopoly crusade, reconsideration of the patent laws is expected. But it is very unlikely that the extremes being proposed by some Congressmen will get serious attention. Some cut in the length of patent life will be considered, but more likely of enactment are other restrictive provisions.

From European

"SAWDUST" BREAD FOR NAZIS

Professor Herbst, University of Danzig, has succeeded in producing flour from wood-cellulose. After this flour is subjected to a special chemical treatment it is said to be particularly suitable for diabetics, and it is baked into a bread called Rofa (Rohfaser) bread. Without special processing, the wood flour is suitable for animal feed. Experiments show that 27 lb. of pork fat can be produced from 180 lb. of wood flour fed to pigs. This 180 lb. costs 10 to 12 marks (about $4) to produce.

CONCENTRATES

• Wage and hour legislation is not yet a dead issue in this session of Congress. The House Labor Committee still is working on a bill . . . A tax of 31 cents per pound would be placed upon imported dried eggs and dried yolks or albumens in a bill introduced by Representative Knutson (Minnesota) . . . Vigorous objection to any reduction in the tariff rates on milk, cream, buttermilk and American cheese has been voiced by National Cooperative Milk Producers Federation in a brief filed with the Committee on Reciprocity Information.

• *Arguing that the domestic brewing industry already is suffering heavily from foreign competition, American Brewers Association has filed with the Committee on Reciprocity Information a brief protesting vigorously against further decreases in the tariff on ale, porter, stout and beer . . . Any reduction in the tariffs on filberts, figs and raisins would be very disastrous to those industries in the West, a group of west coast Senators and Representatives recently told the U. S. Tariff Commission.*

• Railroad freight rates on agricultural products, except tropical fruit, and on animals products are to be increased 5 per cent, by order of the Interstate Commerce Commission. The increase will be about 5.9 per cent on anthracite coal and 10 per cent on other items, except "heavy loading" commodities such as steel. The new rates become effective ten days after the railroads file their new tariffs . . . The federal government has taken charge of the V. Viviano & Bros. Macaroni Mfg. Co., St. Louis, to insure payment of income tax notes given by the factory's officers. A public accountant has been placed on the board of directors to observe conduct of the business and report to the Attorney General.

• *Five million pounds of surplus dry skim milk and 1,200,000 lb. of butter were purchased by Federal Surplus Commodities Corp. recently . . . Milk distributors' profits range from 13 to 27 per cent of their costs, and prices are "dictated" by a small group. That is what the governor and legislature of New York State were told by the state's attorney general, who conducted an investigation of the milk industry. Dairy company officials branded the report as inaccurate . . . Testifying before the Senate Ways and Means Committee, Jay Hormel, president of Geo. A. Hormel & Co., Austin, Minn., said that his company's method of hiring workers by the year had increased efficiency 10 to 20 per cent and had given workers more leisure time.*

• Three men were killed, 17 were injured and damage was done to windows, walls and ceilings of buildings for blocks around when an explosion demolished the boiler house of Horton Pilsner Brewing Co., New York, on March 4. The explosion was attributed to an accumulation of pitch fuel dust in the boiler room . . . CIO unions have been certified by the National Labor Relations Board as bargaining agents for employees of Cudahy Bros. Packing Co., Cudahy, Wis., and of the American Sugar Refining Co., Baltimore, Md.

• *Alaska Fisherman's Union has delayed the beginning of operations in the western Alaska salmon grounds by demands for a higher bonus per 1,000 cases of salmon packed . . . Connecticut has adopted regulations requiring bakery employees to pass a medical examination . . . The canning industry has accepted Revised Simplified Practice Recommendation R146-33, pertaining to corrugated and solid fiber boxes for canned fruits and vegetables.*

Quotas Are Established For Basic Food Crops

Definite 1938 acreage allotments for basic food crops have been announced by Secretary Wallace under the new farm law. The wheat crop is to be 62,500,000 acres as compared with 81,000,000 planted for the 1937 harvest. The corn crop allotment is 94,000,000 to 97,000,000 acres, compared with 99,000,000 last year; the cotton crop, 26,400,000 acres as against 34,300,000 in 1937; the potato allotment, 3,100,000 to 3,300,000 acres as against 3,228,000 seeded a year ago; rice plantings, 825,000 to 875,000 acres compared with 1,081,000 last year; peanuts, 1,500,000 to 1,600,000 as against 2,016,000 a year ago.

In addition to the acreage allotments on cotton there will be a marketing quota, this having been voted by the farmers.

Japanese Agree To Quit American Fishing Waters

Contending with great show of innocence that her fishing fleets cruising in Alaskan waters have been engaged solely in a study of salmon migration, Japan apparently has decided to drop these "scientific endeavors" for the good of her relations with the United States. It has been reported that Japan will meet fully the requests of the State Department that Japanese cease fishing operations off the west coast of the United States.

When this decision was reached in Nippon, Alaskan fishermen were threatening violence upon the Japanese, and organized labor on the west coast was planning a general boycott of Japanese products.

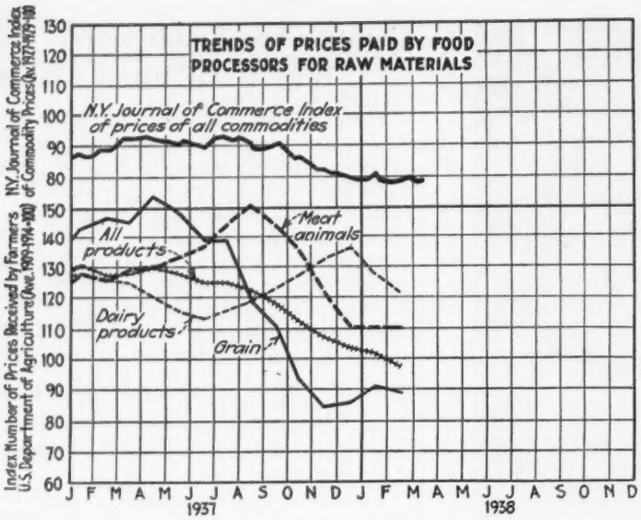
Frozen Pack Conference

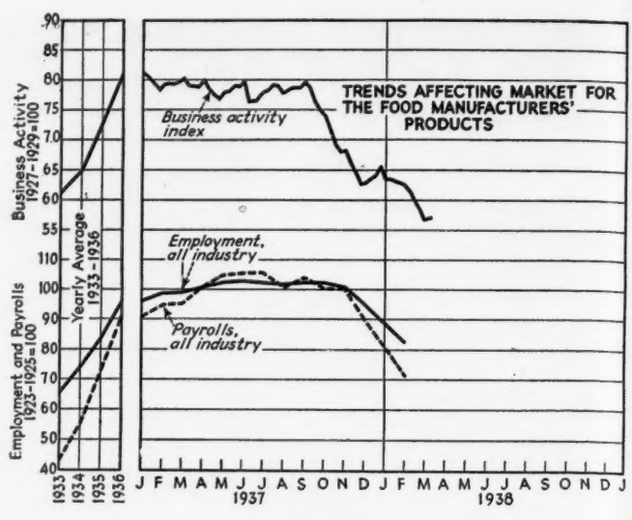
At a technical conference, to be held on April 12, at the Empire Hotel, San Francisco, there will be presented the results of investigations on frozen pack problems. Speakers at the conference will include M. A. Joslyn, C. L. Bedford and W. V. Cruess, Fruit Products Division, University of California, and D. G. Sorber, and E. M. Chace, Food Research Division, Department of Agriculture.

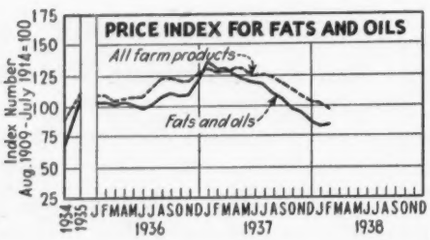
Treaty Aids Food Exports

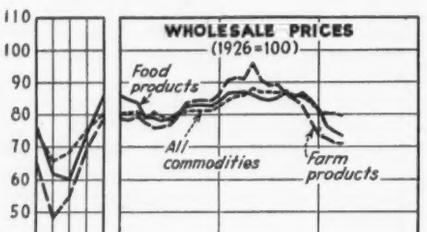
Expansion of the foreign market for certain American foods is expected to result from the reciprocal trade agreement negotiated with Czechoslovakia. Provisionally effective on April 16, the treaty lowers the duty on dried and fresh fruits, canned fruits and vegetables, roasted cereals, chewing gum, nuts, lard, canned pilchards and canned salmon. A larger quota is granted for lard, and favor is granted wheat in that the importer may now take wheat flour from whatever country he prefers.

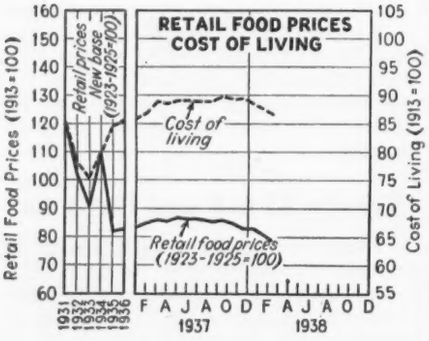
Concessions granted Czechoslovakia by the United States.


TRENDS OF PRICES PAID BY FOOD PROCESSORS FOR RAW MATERIALS
N.Y. Journal of Commerce Index of prices of all commodities
All products
Meat animals
Dairy products
Grain
Index Number of Prices Received by Farmers U.S. Department of Agriculture (Ave. 1909-1914=100)
N.Y. Journal of Commerce Index of Commodity Prices (Av. 1927-1929=100)
1937
1938









Prices received by farmers are from the U. S. Department of Agriculture. Employment, payrolls, wholesale prices and retail prices from the U. S. Department of Labor. The business activity index is that of *Business Week*. The cost of living index is from the National Industrial Conference Board. The data on fats and oils are from the Bureau of Raw Materials for American Vegetable Oils and Fats Industries.

BUSINESS TRENDS

Food Commodity Prices Exhibit No Trend

Stagnation in general marked the performance of food raw materials prices during the month from mid-February to mid-March, in spite of European war scares and other alarms. Beef, lamb, pork, lard, and cottonseed oil showed slight increases in price for the month, while wheat, flour, eggs, butter and cheese showed small price declines. Imported products, including raw sugar, coffee and cocoa beans also declined somewhat.

Parallel with these movements, small declines were also registered by the sensitive commodity indexes, *Moody's* falling from 149.7 to 148.7 for the month, and the *New York Journal of Commerce* daily index falling from 122.0 to 121.8. In contrast, the *Journal of Commerce* weekly index of business activity rose from 68.9 to 70.5 in the same four weeks.

As an evidence of the general stagnation of price levels, it is noteworthy that the *New York Journal of Commerce's* weekly price index, which covers 110 commodities, has moved only between a high of 80.5 and a low of 78.3 during the last four months. This indicates a condition of price stability that leads many economists to think that we have reached the bottom of the present price recession.

Wheat Prices Wabble

Following the 1937 high yield of wheat, present prospects are for another good yield in 1938. In spite of dust storms in parts of Colorado and Oklahoma, and some water shortage in parts of the Plains States, precipitation over the wheat growing area has in general been sufficient to indicate a break in the cycle of dry years.

As a natural consequence of this improved weather condition, wheat prices have been trending downward. On Jan. 17, 1938, the price of No. 2 hard winter wheat at Kansas City was $1.02 to $1.09¼. By Feb. 17, the level had receded to $0.95 to $1.03½, and on March 17, the price stood at $0.88 to $0.97. A year previous, on March 17, 1937, the price of this grade of wheat stood at $1.33½ to $1.41½. The Minneapolis price for No. 1 dark northern wheat has experienced a parallel decline.

Less Farm Acreage For Important Crops

Farmers' intentions to plant, as reported by the United States Department of Agriculture on March 18, indicate that, if yield is the same as in 1937, supplies of some major food raw materials will be somewhat smaller.

Corn plantings, for example, are fore-

Crop	1938 Indicated Planting in Acres	1937 Planting in Acres	1937 Yield
Corn	94,595,000	96,483,000	2,644,995,000 bu.
Spring Wheat	22,282,000	23,750,000	188,891,000 bu.
Oats	36,333,000	37,101,000	1,146,258,000 bu.
Barley	10,947,000	11,570,000	219,635,000 bu.
Rice	1,073,000	1,093,000	53,004,000 bu.
Potatoes	3,102,000	3,216,000	391,159,000 bu.
Sweet Potatoes	855,000	843,000	75,393,000 bu.
Beans (dry, edible)	1,837,000	1,943,000	15,839,000 bu.
Soy Beans	5,906,000	6,139,000	40,997,000 bu.
Peanuts	2,050,000	1,945,000	1,291,655,000 lb.

cast at 94,595,000 acres for 1938. Last year the acreage of this crop was 96,483,000 acres and the crop was 2,644,995,000 bu. In 1935, when the drought kept the yield down, 100,599,000 acres produced only 1,507,089,000 bu. Forecasts for 1938 plantings with last year's plantings and yield for nine other important crops are shown in the table.

New Record Hung Up For Fats and Oils Use

According to a report of the Bureau of Agricultural Economies, released on March 14, the calendar year 1937 saw a new high record made in U. S. consumption of fats and oils. The total reported was 9,309,000,000 lb., an increase of 136,000,000 lb. over 1936, the previous record year; and more than 500,000,000 over the consumption reported for 1929.

This record consumption included an increase of around 400,000,000 lb. in the use of cottonseed oil, and around 100,000,000 lb. of palm kernel oil. Use of linseed and tung oils also increased. Decreases were recorded in the use of coconut oil, rape seed oil, lard, edible tallow and grease, perilla oil and hempseed oil. Teaseed oil, public enemy No. 1 in the present edible oil picture, showed an increase in consumption in 1937 of 21,000,000 lb. over the 1936 figure, more than offsetting the decrease in olive oil consumption.

Meat Turns Upward After Long Decline

Considerable recovery was evident in live stock markets during the period from mid-February to mid-March. Starting in the first of these four weeks, and with but one dip of short duration, prices of beef cattle, hogs, sheep and lambs climbed steadily until, on March 14, the highest prices for 1938 were recorded in the Chicago live stock market.

Construction News

	Pending (thousands)	Awarded March (thousands)	Total Awarded 1938 (thousands)
Bakery	$40	.....	$280
Beverages	525	$394	1,428
Canning and Preserving	185	.....	75
Confectionery	.....	.....	.....
Grain Mill Products	.....	.....	.....
Ice Manufactured	40	.....	260
Meats and Meat Products	145	.....	1,073
Milk Products	160	40	230
Miscellaneous	650	900	1,598
	$1,745	$1,334	$4,944

Along with this increase in live stock prices has gone an increase in the wholesale prices of meat products. The following table shows the recent performance of the wholesale meat market:

Prices in Cents Per Pound

	Jan. 17	Feb. 17	March 17
Beef steers	12½–14	13 –14	13½–14½
Lamb	15½–16½	12½–14	16 –16½
Pork Loins	15½–16½	17 –19	19 –20
Pork shoulders	14 –15	14½–16	14½–15½

Sugar Stock Trend Reverses Direction

Although world sugar consumption in the 1936-37 crop year stood at a new high, stocks also increased, reversing a six-year trend.

Lamborn & Company reports world sugar production for the crop year ending Aug. 31, 1937, at a new high of 30,818,000 long tons, compared to 28,846,000 long tons produced in the previous season. World consumption for the year ending Aug. 31, 1937, is reported by the same source at 30,549,000 long tons.

These figures indicate an excess of production added to stocks of 269,000 tons, making total stocks on Aug. 31, 1937, of 8,877,000 tons. On the same date in 1931 stocks stood 12,362,000 tons, from which level a decrease was recorded each year until 1936-37 crop-year.

Business Baffled

With one European crisis following close on the heels of another, and with nothing much in the way of encouragement coming out of Washington, business waited through the month from mid-February to mid-March in a mood of baffled expectancy. Meanwhile, most indexes have bumped along at or near the bottoms established three or four months ago. For example, the *New York Journal of Commerce's* weekly wholesale price index stood at 78.8 on December 31, 1937 and at 78.5 on March 12, 1938. In contrast, the *Business Week* index of business activity, which makes allowance for normal growth, showed a drop, from Feb. 12 to March 19, of 3.31 per cent.

Indicators of business activity also showed little change during the four weeks from Feb. 12 to March 12, with steel production, automobile output and electric power production practically unchanged. One bright spot for the month was the increase in heavy construction contracts awarded, which jumped from $45,001,000 to $80,524,000, the highest point since June, 1937. *Moody's* index for the period rose from 148.6 to 149.3, while Fisher's index fell from 82.4 to 82.3.

The United States Department of Labor index of wholesale prices of all commodities, in the five-week period ending March 12, fell 0.37 per cent while this same index for farm prices rose 1.12 per cent and for food prices fell 0.94 per cent. For the five-week period from Feb. 19 to March 26, the *New York Journal of Commerce's* weighted indexes of commodity prices fell 0.63 per cent for the general index and 5.31 per cent for the grain index, while the food index rose 1.18 per cent.

INDICATORS

OLEOMARGARINE SALES for January, 1938, were reported by the American Butter Institute at 42,254,842 lb., compared to 34,025,428 lb. in January, 1937.

SALMON PACK in Alaska in 1937 totaled 6,669,665 cases, the third largest pack in history, compared to 8,437,603 cases in 1936, which is the record year.

FROZEN FISH holdings in the United States on Feb. 15, 1938, were 62,152,000 lb. compared with 69,629,000 lb. on Feb. 15, 1937, and a five-year average for the date of 46,856,000 lb.

CURED HERRING in storage on Feb. 15, 1938, amounted to 13,268,000 lb., compared with 18,331,000 lb. on the same day in 1937, a decrease of 28 per cent.

APPLES in cold storage on March 1, 1938, totaled 19,573,000 bu., a high record for the date, and comparing to 12,193,000 bu. a year before, and a 1933-37 average of 13,975,000 bu.

FROZEN FRUITS in storage on March 1, 1938, were reported at 110,807,000 lb., twice the figure of 55,825,000 lb. reported on March 1, 1937, and comparing with a 1933-37 average of 57,479,000 lb.

FROZEN VEGETABLES in storage on March 1, 1938, totaled 25,992,000 lb., compared with 10,291,000 lb. on the same date in 1937.

BUTTER, creamery, in storage on March 1, 1938, amounted to 20,930,000 lb. The quantity in storage a year previous was 20,678,000 lb., and the 1933-37 average for the date was 17,088,000 lb.

CHEESE in storage on March 1, 1938, was reported at 85,655,000 lb., compared to 93,114,000 lb. on March 1, 1937, and a 1933-37 average of 73,275,000 lb.

EGGS, case equivalent, in cold storage, including frozen eggs, totaled 2,808,000 cases on March 1, 1938. The March 1, 1937, figure was 1,305,000 cases and the 1933-37 average was 1,266,000 cases.

POULTRY in cold storage, March 1, 1938, amounted to 100,518,000 lb. The total a year before was 157,858,000 lb., and the 1933-37 average was 108,175,000 lb.

MEAT, frozen and cured, all kinds, in storage on March 1 of this year amounted to 719,912,000 lb., compared with 1,079,166,000 lb. a year before and a 1933-37 average of 824,108,000 lb.

LARD in storage on March 1, 1938, was reported at 116,856,000 lb., compared to 202,476,000 lb. a year before and a 1933-37 average of 125,125,000 lb.

WEEKLY FOOD INDEX of Dun & Bradstreet stood at $2.48 on March 15, 1938, compared to $2.44 a month before, $2.53 on Jan. 4, 1938 and $3.01 on March 15, 1937.

MEN, JOBS and COMPANIES

INDUSTRIES

» ADOLPHUS RICE MILLING CO., INC., a new company formed by A. L. Pfeffer and associates, will build a $100,000 plant at Houston, Texas. The plant will have a daily capacity of 1,440 bbl. of rice.

» ARMOUR & Co., Chicago, will begin construction of a $1,000,000 plant at Houston, Texas, this summer. Armour recently remodeled and reopened its branch at Chattanooga, Tenn.

» BUCKEYE BREWING Co. will spend $150,000 in an expansion program which will enlarge almost every unit of its Chicago plant. This company has been in business almost 100 years.

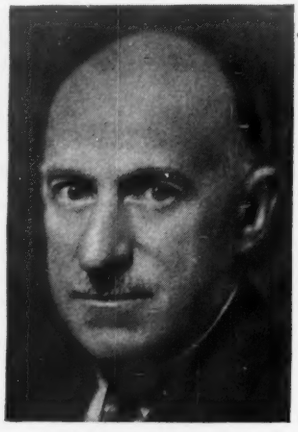
» CHEF BOIARDI FOOD PRODUCTS Co., Cleveland, has purchased a factory at Milton, Pa., and will convert it into a canning factory.

ULTRAVIOLET IN INDUSTRY

Industrial applications of the Sterilamp (FOOD INDUSTRIES, June, 1936, page 295) are steadily increasing, its ultraviolet rays being used to kill mold and bacteria. Here is an installation in the meat cooler of Scherer & Co., Mahwah, N. J. Beef may be aged rapidly without molding under this lamp.

» CALIFORNIA-HAWAIIAN SUGAR REFINERY, Crockett, Calif., was closed recently by a strike. The CIO is challenging the effectiveness of the company's closed-shop contract with Sugar Refinery Employes' Union, an AFL affiliate.

» MARION T. FANNALLY, INC., Ponchatoula, La., is building a new plant for freezing foods which will have a capacity of 1,000 bbl. per day. The company is installing a precooling room in which it will place all fruits brought in from the fields. This will enable it to pack continuously.



MAX WATERMAN

Through the expansion program announced by Honor Brand Frosted Foods Corp., of which he is president, Mr. Waterman becomes an even stronger factor in the rapidly growing frozen food industry. Honor Brand recently announced an arrangement whereby Stokely acquired a minority stock interest and will be the principal supplier of frozen fruits and vegetables distributed under the Honor Brand label (see page 216).

» GRAFF PACKING Co., Shawnee, Okla., has enlarged and modernized its plant, doubling the capacity.

» GEORGE A. HORMEL & Co., Austin, Minn., plans to install additional equipment at its plant in Houston, Texas.

» LEIBMAN ICE Co., Oklahoma City, Okla., recently opened a frozen food market with a locker capacity of 1,000. A retail market is also operated in connection with the locker service.

» MISSISSIPPI VALLEY CANNING Co., INC., is constructing a canning plant at Osceola, Ark. Spinach will be the principal product packed this year.

» NATIONAL BISCUIT Co. is increasing the capacity of its carton manufacturing plant at Marseilles, Ill., from 90 to 150 tons daily. New equipment costing about $1,400,000 is being installed.

» NIAGARA FROSTED FOODS, LTD., Hamilton, Ont., has been organized to freeze and pack fruits and vegetables. Packing companies at Stoney Creek, Fonthill and Kingston, Ont., have been taken over by the company.

» PLANKINTON PACKING Co., Milwaukee, Wis., is modernizing its hog-killing plant at an estimated cost of $125,000.

» RUNKEL BROS., INC., New York, has been taken over by Lamont, Corliss & Co., the transaction including processes, tradenames and good will. Runkel's cocoas, coatings and chocolate products are being manufactured by Peter-Cailler-Kohler Swiss Chocolate Co., Inc., Fulton, New York. The company is a subsidiary of Lamont, Corliss & Co.

» SALADA TEA Co. OF CANADA, LTD., has been incorporated in British Columbia as an extra provincial company. The paid-up capital of the firm is $2,000,000. Head offices are at Toronto, Ont.

» A. E. STALEY MFG. Co., Decatur, Ill., has completed a new laboratory building.

» SUNNYLAND REFINING Co. has established an oleomargarine plant at Birmingham, Ala. Negotiations are under way to cover the entire Southern states with a sales organization and later to expand into the East and the North. The new plant will have a capacity of 6,000 lb. per day.

» SWIFT & Co., Chicago, has added to its chain of ice cream plants the ice cream division of United Dairies, Inc., Chattanooga, Tenn. Swift also acquired recently the ice cream units of Southern Ice Co. in Fort Worth, Dallas and Cleburne, Texas. Another move in Swift's expansion is its plan to partially remodel the building occupied by Federal Packing Co., Cleveland.

» VICANA FOODS, INC., is completing a plant for freezing pineapple at Havana, Cuba. The plant will be operating this month, using the "Z" process. One-pound and 10-lb. packages will be distributed.

PERSONNEL

» W. H. BARTEL, New Orleans, is the new president of Louisiana Bottlers Association.

» D. E. BROWN, Glasgow, Ky., recently was named president of the Southern Association of Ice Cream Manufacturers, succeeding D. R. Smith, Miami,

» L. E. COLLIER has succeeded the late Roy Faulk as superintendent for Washburn Crosby Co., Minneapolis.

» EDWARD D. CONLEY, Ideal Dairy, Portland, Ore., heads up the Oregon Butter & Ice Cream Makers' Association for the coming year.

» ROBERT S. DICKINSON now is president of Nebraska Consolidated Mills Co., having succeeded A. R. Kinney, who has become chairman of the board.

» JOHN R. DOWNEY, Columbus, has been elected president of Ohio-Buckeye Brewers Association. Mr. Downey is

president of Washington Breweries, Inc., Columbus, and of the Joyce Products Co. and Downey-Joyce 7-Up Co., Norwalk, Ohio.

» LOUIS ENTIN has been appointed manager of the traffic department of S. Gumpert Co., Inc., Ozone Park, N. Y.

» G. W. FRIER, Texarkana, again heads up the Arkansas Association of Ice Cream Manufacturers.

» A. M. GIBSON recently returned to Jacksonville, Fla., to again assume the duties of manager of Ward Baking Co.'s plant. He returns to a position which he held 11 years ago, having served meanwhile in a similar capacity in Boston.

» W. P. HARTMAN, father of the fruit and vegetable standardization program in Michigan, has resigned as general sales manager of W. R. Roach Canning Co. to become sales manager and assistant general manager of Columbus (Wis.) Food Corp. Mr. Hartman had been with Roach thirteen years.

» MAJOR S. HOWE, formerly superintendent of the Niagara Falls Milling Co., Lockport, N. Y., has accepted a similar position with William Hamilton & Son, Inc., Honeoye Falls, N. Y.

» ERNEST HUREGAR, Marshall County Creamery, Lewisburg, Tenn., has been named president of Tennessee Dairy Products Association.

» CHARLES H. JANSSEN, Columbus, Ohio, secretary-manager of National Association of Margarine Manufacturers since its organization in 1936, has been elected president. Frank W. Abke, Standard Nut Margarine Co., Indianapolis, was chosen vice-president; Howard Beatty, Durkee Famous Foods, treasurer; and Dr. J. S. Abbott, secretary.

ROWLAND J. CLARK

On April 4 he will become director of research for Shellabarger Mills, Salina, Kan. He has been associate professor of milling at Kansas State College, Manhattan, Kan.

», W. E. LOVELL, formerly with Meier Ice Cream Co., Milwaukee, heads up the new ice cream division of Bowman Dairy Co., Chicago.

» T. C. MCKINLEY, Charleston, W. Va., has received the Cincinnati achievement award for distinguished service in the brewing industry, presented by the Cincinnati members of Master Brewers' Association. Mr. McKinley is executive secretary of the Beer Institute of West Virginia.

» WEB MADDOX, Fort Worth, has been elected president of Milk Dealers' Association of Texas.

» CARL MARTY, JR., has been elected president of Blumer Brewing Corp., Monroe, Wis., succeeding Fred Blumer, who resigned.

» G. A. MEISNER, Wittenberg, is again president of Wisconsin Bottlers of Carbonated Beverages.

» CHARLES MERRILEES, T. H. Taylor Co., Ltd., Chatham, Ont., has been made chairman of District No. 8 of the Association of Operative Millers.

» C. D. PRICE, Stanley, recently was reelected president of Virginia Canners' Association.

» WILSON C. PRICE has become president of Jamestown (N.Y.) Baking Co., Inc.

» HARRY J. RICHEY has been transferred from the Columbus branch of National Biscuit Co. to the managership of the Cincinnati division. P. R. Geyer was transferred from Cedar Rapids, to Columbus, to replace Mr. Richey.

» GEORGE TAYLOR, of the bread department of National Biscuit Co., was elected president of Buffalo (N.Y.) Bakers' Exchange at the annual meeting recently.

» BLAINE THOMPSON, general sales manager of Texas Star Flour Mills, Inc., has resigned to become general manager of Morton Milling Co., Inc., Dallas, Texas. B. T. Irwin has succeeded Mr. Thompson.

» G. HOWARD WALDOCK, former secretary and treasurer of Waldock Packing Co,. Sandusky, Ohio, will establish a packing plant in Cleveland in the near future.

» RALPH D. WARD has resigned as vice-president of Borden Co., New York, where he had been in charge of sales and advertising of manufactured dairy products. Mr. Ward is president of Drake Bakeries, Inc., and will devote his full time to these other interests.

» V. C. WHITNEY is the new assistant to the general manager of Walla Walla (Wash.) Canning Co. He had been with Ashenfelter & Balfe, New York broker.

» C. L. WIRTH has succeeded B. A. Bergenthal as president of Red Star Yeast Products Co., Milwaukee. Mr. Bergenthal has become chairman of the board.

DEATHS

» CARL AUSBECK, 45, vice-president of Abilene (Kan.) Flour Mills Co., March 5, at University City, Mo.

» DR. DAVID A. COLEMAN, senior marketing specialist of the Bureau of Agricultural Economics, Feb. 25, following an operation for appendicities. Dr. Coleman was noted for his work on standards for wheat and other grains and for research on the milling and baking properties of wheat. He was known for work on barley malt. Dr. Coleman was editor-in-chief of *Cereal Chemistry*.

» WILLIAM N. BROWN, 76, president since 1904 of the Selma (Ala., Coca-Cola Co., recently.

» BENJAMIN H. HARRISON, 49, partner in the firm of Plochman & Harrison, Chicago mustard manufacturers, Feb. 24.

» WILLIAM L. HARVEY, 66, president of International Milling Co., March 13, at Palm Springs, Calif. Mr. Harvey had been in the flour business since 1896.

» RICHARD L. KAUFMAN, 69, former president of Grocers Biscuit Co., Louisville, Ky., recently.

» JAMES H. POST, 78, chairman of the board of National Sugar Refining Co. of New Jersey and an official in other sugar companies, at New York, March 5.

» YOUNG TSUNG-CHING, China's flour king, at Hongkong, Feb. 13. He was owner of twelve flour mills under the name of Soong-Sing at Shanghai, Wasih, Tsin and Hankow, most of which are now in possession of the Japanese.

ASSOCIATED INDUSTRIES

» ANCHOR HOCKING GLASS CORP. has been formed at Lancaster, Ohio, by the consolidation of Anchor Cap Corp. and Hocking Glass Co., comprising nine manufacturing plants, two nation-wide sales organizations and a diversified line of containers and closures.

» AUDUBON WIRE CLOTH CORP. has appointed Cleveland Duplex Machinery Co., Inc., to handle all of its products in the Cleveland district.

» CREAMERY PACKAGE MFG. CO., Chicago, has elected George W. Putnam a vice-president.

» LUDLUM STEEL CO., Watervliet, N. Y., has appointed Gerald P. Howk as its mill representative in the Cincinnati territory.

» SPROUT, WALDRON & CO., has appointed W. S. Otto district sales engineer for the St. Louis territory.

» WESTINGHOUSE ELECTRIC & MFG. Co. has elected George H. Bucher president. He had been executive vice-president.

(*Continued from page* 192)

be economically possible through technology to provide adequate methods of preservation and storage in order to adjust distribution to the ability of the markets to absorb the products. A controlled non-uniform flow of products would thus eliminate ruinous fluctuations in prices.

Improved refrigeration gave great impetus to the fishery industries, as it always does for any highly perishable commodity. In fact, fishery technology pioneered in the development of quick freezing because of the great need. Today, it is entirely possible to freeze strictly fresh fish in such manner that no difference can be detected between the fresh and frozen fish with respect to food value, flavor, or appearance, even after many months. However, the expansion of the frozen-fish industry has been limited by unsatisfactory wholesale and retail outlets. Comparatively few wholesalers and retailers have the necessary refrigeration and merchandising facilities for holding and delivering fish to the consumer with the original fine quality and appearance with which it came from the quick-freezing plant. As soon as food processors assist their wholesale and retail outlets in overcoming this difficulty, the production and sale of frozen foods will increase tremendously. And this applies to all frozen foods.

In considering the utilization of a raw material as perishable as fish, processing at centralized points becomes of great economic importance because of the elimination of waste. Very valuable byproducts can be made from the wastes accumulating at a large processing establishment. Few other food processing industries find byproducts of such relative importance. A rough estimate will indicate that byproducts represent about 15 per cent of the total value of all fishery products. In some of the individual fishery industries, byproducts are of much greater relative value.

The maintenance and improvement of byproduct quality is also of primary concern. For example, it was improved technology which lifted fish meal out of the fertilizer field into animal feeding, both a more profitable and more valuable economic use. The old method of acidulating the waste has been superseded in turn by various types of flame, hot-air, steam and vacuum drying which produce an animal feedstuff of unexcelled food value.

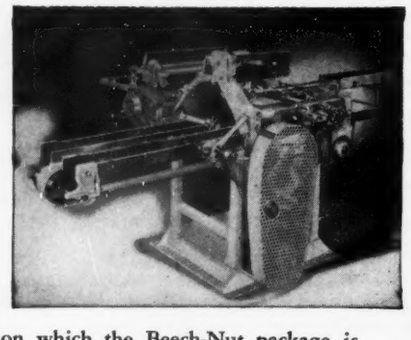
A parallel development has occurred in the fish-oil industry. Fish oils were originally crudely made by rotting the livers or by crude methods of cooking to yield a product so unstable and so objectionable in odor that it was even limited in industrial uses. Now improved methods of cooking, rendering, and mechanical and solvent extraction are used to produce highly valuable medicinal products such as halibut-liver oil and cod-liver oil, absolutely essential as sources of vitamins.

CENTRALIZED PROCESSING has greatly helped the byproducts industries by making available at one point waste materials in sufficient quantities to justify economic reduction. Improved methods of freezing, stimulating the filleting of fish, have made more of the waste available for reduction into byproducts. Thus widespread use of refrigeration in food processing has also increased the production of byproducts.

The advantage in marketing fish fillets instead of selling whole fish lies not alone in the fact that a fish fillet in an attractive package is much more apt to be purchased by the consumer. This method of marketing is fundamentally a more economic way of merchandising foods. Not only is the

Prize Package

wrapped on our Model FA-2



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The Beech-Nut prize package is perfectly wrapped by our Model FA-2 Machine.

Neatness of end folds, and smooth, tight surfaces are evident. Firmly sealed paper with a glossy protective coating assures lasting freshness of the crackers.

The versatile FA-2 wrapping machine on which the Beech-Nut package is wrapped, offers a high degree of economy and efficiency to manufacturers in many fields of the packaged goods industry. Handles a wide variety of sizes, is adaptable to transparent cellulose, glassine and waxed paper, as well as printed wrappers. The FA-2 not only handles ordinary cartons, but may be used for wrapping open boats.

Consult our nearest office for more information on this highly versatile wrapping machine.

PACKAGE MACHINERY COMPANY, Springfield, Massachusetts

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PACKAGE MACHINERY COMPANY

Over a Quarter Billion Packages per day are wrapped on our Machines

housewife relieved of the unpleasant duty of cleaning and removing the non-edible parts, but the waste which formerly went into the garbage can, or to the alley cat and dog, now goes into useful byproducts.

These trends have, in turn, brought about the need for more thorough studies in warehousing technology—more knowledge concerning the proper temperature and humidity for storing frozen fish. Both temperature and humidity are of technical and economic importance, because they affect the necessity for reglazing fish and have an influence on the losses resulting from rancidity and the like.

Likewise, the proper manufacture of a byproduct is of vital importance. Thus, unless fish meal is to be consumed immediately without storage, it should be manufactured with a moisture content and oil content of 6 per cent or less, each. Improper manufacture of an organic material, such as fish meal, resulting in a high moisture or oil content (either or both), may cause overheating in storage warehouses, some times resulting in disastrous fires brought about through spontaneous combustion.

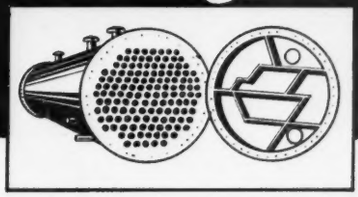
Modern transportation and distribution equipment have been a great help in the effective merchandising of such perishable food commodities as fish. Not only does proper packaging contribute to sanitation and improved appearance, but it is one of the best selling points yet found. Fish fillets, steaks and the like, wrapped in vegetable parchment with an attractive label, or put up in cans or glass containers, are in demand by the modern housewife. Efficient, sanitary and rapid means of transportation have brought fresh and frozen fish to parts of the country where they were never available before. The modern package on display in a clean and attractive retail store is so far superior to the old wooden boxes and barrels of melting ice that if wholesale and retail stores would provide the facilities, there undoubtedly would be increases in sales. Here also is a great opportunity for offsetting seasonable variables.

Certain food products—such as meat, fish, poultry, eggs and cheese—compete with one another. Since meat supplies the greatest bulk of these foods, the others are often considered "substitutes." More intelligent and more active sales promotion among food processors and distributors would tend to relieve this attitude somewhat by indicating that each food has certain individual merits with respect to nutritive value, flavor, variety and so forth.

Since we are dealing primarily with a basic food industry when we discuss fishery technology, this article would not be complete without a brief mention of biochemical and nutritional studies of the value of fishery products in the diet of man and his domestic animals. We have already touched upon the economic importance of fish meal and fish oils in the rations of farm animals. Other fishery byproducts, such as kelp and seaweed meal and oyster- and clam-shell products, are also ingredients of feedstuffs. Scientific evidence shows that fishery products, as a class, are excellent sources of such nutritional factors as vitamins, proteins and minerals.

In conclusion, I wish to point out that recent developments in fishery technology are creating new American industries, are pointing towards new avenues of profitable business for existing industries and are contributing to the health and economic welfare of the American people.

BEFORE
THE HOT SUMMER MONTHS,
restore condenser efficiency



HELP your refrigerating equipment face the severe conditions of warm weather with higher operating efficiency. One of the best things you can do is, fortunately, also easy and economical. Remove heavy scale and rust deposits from your ammonia or other refrigerant condensers and you automatically restore normal heat transfer capacity to these important units.

QUICKLY . . . SAFELY . . . AT LOW COST

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Write for helpful data on condenser cleaning, and on all plant and equipment maintenance. No obligation.

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OAKITE CERTIFIED CLEANING
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MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

Manufacture of Applesauce

(*Continued from page 194*)

Size, In.	Apples per Bushel	Percentage Waste
2¼ to 2½	275	40%
2½ to 2¾	200	30%
2¾ to 3	160	20%–25%
3 to 3¼	135	....

The 54 in. diameter by 54 in. straight side digester, as shown in the illustration, requires 1,800 lb. of pared and cored fruit per batch every fifteen minutes.

Assuming an average bushel weight of 50 lb. for the unpared fruit and taking an apple size of from 2½ to 2¾ as a good average, we find, from the table, that there is a 30 per cent waste through the process. This will give us a final bushel weight of 35 lb. for the pared fruit. 1,800 lb. pared fruit required at 35 lb. per bu.=51.4 bu. required per batch every fifteen minutes.

From these figures, then, the requirements are 7,200 lb. of pared fruit per hour, or 205.6 bu. of apples. As mentioned elsewhere in this article, fifteen peelers have an output of 7,500 lb. per hour. While this output is somewhat more than the requirements, it is best to allow for contingencies and insure a steady flow of fruit to the digester.

On a weight basis, the input per digester unit is as follows:

Pared and cored apples.....	1800.0 lb.
Sugar (sucrose) 51.4x10 lb. sugar	514.0 lb.
Total input.....	2314.00 lb.

The output of applesauce from the digester will depend upon line losses and weight losses at the finisher and filling machine. At one canning factory, with the input weight as given above, the output of the digester in connection with the finisher and filling machine was 2,180 lb. of finished sauce. Neglecting the amount of water added to the apples on cooking by condensation of the steam, because of lack of data, the following efficiency is shown:

$$\text{Per cent efficiency} = \frac{\text{Output}}{\text{Input}} \times 100$$

$$\frac{\text{2,180 lb. output}}{\text{2,314 lb. input}} \times 100 = 94.2 \text{ per cent efficiency}$$

While this percentage, because of the water of condensation, is not strictly true, it does show the trend and can be used as a check on the general performance. Condensation tests with water in the digester and using 40 lb. per sq. in. steam pressure at the injectors shows that about 182.6 lb. of water are added to the total weight. As the actual steam condensed will be near this amount, the overall efficiency from the digestor to the filling machine, if we add this condensate to the input weight, is 87.5 per cent.

While the digester or pressure type of cooker is essentially a batch type of machine, several of these units may be so operated as to give continuous production. The batch production of each cooker can be synchronized with the peeling line and filling machine, points of greatest labor costs, so as to keep these units in constant operation.

Three digesters like that illustrated here will require only one operator on the cooking platform and one operator at the finishing machine. The sugar will have to be weighed and supplied to the cooking platform in the correct amounts for each batch. The operating time schedule is as follows:

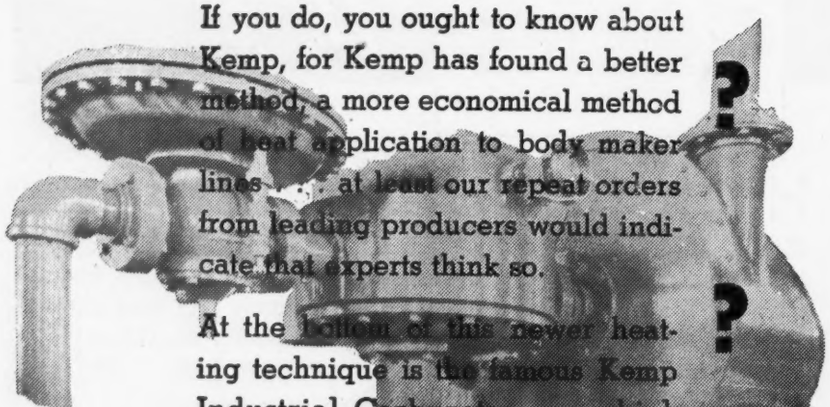
	Minutes
Loading Digester (apples and sugar)..	15
Steaming without agitation.....	5
Steaming with agitation.....	20
Steam off—agitation continued.....	5
Discharging and Finishing.....	5
Filling	20

On this schedule three digester units have a minimum production in 10 hours of 2,500 cases of 24 No. 2 cans of applesauce. This production is based on the experience of one plant where 245 gal. of finished applesauce was obtained per cooker unit.

Each digester unit requires approximately fifteen boiler horsepower per batch. Steam must be available at 40 lb. per sq. in. at the injector nozzles.

DO YOU MAKE

CANS?



If you do, you ought to know about Kemp, for Kemp has found a better method, a more economical method of heat application to body maker lines . . . at least our repeat orders from leading producers would indicate that experts think so.

At the bottom of this newer heating technique is the famous Kemp Industrial Carburetor . . . which premixes gas-and-air so it may be burned in enclosed chambers and more efficiently than ever before. It's quite a story and may repay you even better than the year's best seller. May we send it? Just address **The C. M. Kemp Mfg. Co., 405 East Oliver Street, Baltimore, Md.,** and tell us you roll your own.

KEMP of BALTIMORE

Industrial Relations

(*Continued from page* 183)

Magazine, H. G. Wells, in a brilliant and penetrating analysis of the American scene, says, "I question indeed if the United States has sufficient time ahead to go through a phase of class politics at all. It has had all the possibilities of that worked out for it and ready for study—from Great Britain to Russia. It is an unprecedented country in its size, its freedom and its physical opportunities, and I think the world has a right to expect something characteristic and original from it."

There's a challenge worthy of the highest qualities of leadership. The past year, characterized as it was by industrial strife, intense unionization drives, and economic recession, when viewed against the background of American tradition, indicates that the United States can, if employers and labor leaders will come to their senses, be original in its social-economic pattern—that class politics and traditional unionism are not inevitable and that a way out can be found through the scientific approach.

Sodium Alginate

(*Continued from page* 196)

the cream is smooth, after which it is bottled and held at approximately 40 deg. F. until delivered.

Other products to which stabilizer is sometimes added are the soft cheeses such as cream cheese, whole milk cheese of the Neufchatel type, and cheese spreads. The addition of the right kind and amount of stabilizer will tend to produce a smoother and firmer textured product, with less fat loss in manufacture and less serum drainage from the finished product. When sodium alginate is used in the cheese, from 0.1 to 0.2 per cent should be used, figured on the weight of the cream. The product is dissolved in hot water and is added to the cream before pasteurization. Except for this change, the cheese should be made in the usual manner.

Ordinarily, cream cheese is made by standardizing milk to about 15 to 20 per cent fat by the addition of cream. However, Dahlberg (4) has suggested an entirely different way of making cream cheese. This method is sometimes called the "hot pack process" and lends itself well to the preparation of soft cheese and cheese spreads packed in glass containers.

In this method 40 to 45 per cent cream is used as a base. To this cream 5 per cent of high grade powdered skim milk is added. Then the stabilizer is incorporated. In the original method 1 per cent of gelatin or 0.5 per cent of agar were used. The use of 0.8 per cent sodium alginate is also satisfactory. The mixture to which the stabilizer is added is pasteurized at a temperature of 145 deg. F. (or higher if necessary to dissolve the stabilizer) and is cooled to 110 deg. F. At this temperature 0.75 per cent salt and 1 per cent starter are added. The mixture is then homogenized at about 3,500 lb. pressure and immediately packaged in the final container, precooled to 70 deg. F. and held at this temperature for ten to fifteen hours or until sufficient acid develops. The product is then the finished cheese and should be stored at 35 to 40 deg. F until sold.

Doubtless there are many uses to which a satisfactory stabilizer may be put in the manufacture of processed foods and drugs. The author has had inquiries about sodium alginate from fruit byproducts makers and wholesale drug houses, and has heard of one instance where the product is being used successfully in the manufacture of a well-known tooth paste.

Check these six Lo-Bax Facts
1
Kills bacteria QUICKLY—no faster killer on the market.
2
Dissolves quickly—makes CLEAR dairy rinse solutions.
3
Contains 50% available chlorine.
4
Does not lose its strength.
5
Solutions effective hot or cold.
6
Easy to use—low in cost.
WHY YOU NEED A DEPENDABLE QUICK-ACTING STERILIZER
Spoilage losses from bacterial contamination will take an enormous toll of profits in many food plants during 1938. Have you taken steps to safeguard your products by means of a rigid sanitary routine coupled with a dependable, quick-acting sterilizer like Lo-Bax? This convenient germ-killer is so economical that you can use it everywhere—on equipment, containers, floors, walls, ceilings. Write us for full information.
The MATHIESON ALKALI WORKS (Inc.)
60 East 42nd Street New York, N. Y.
Pioneer Manufacturers of Chlorine Products for Over Forty Years
FREE Measuring Spoons
HTH
LO-BAX
CONCENTRATED BACTERICIDE
FOR LOW BACTERIA COUNTS
AVAILABLE CHLORINE - 50%

Markets for Baked Goods

(*Continued from page* 198)

New Jersey, and Indiana should be especially interested because, in spite of the high purchasing power of the *average* family in these states, the annual per family purchases are comparatively low.

Bakers should not worry about the manifested low averages of certain states but should find out the basic causes of the unsatisfactory consumption. In some instances, it will be distribution; in other cases the product itself; while in the South, especially, the low purchasing power of average family unit will be the main cause for the low consumption values.

The next step is the determination of the "ceiling" of the potential demand, which is the *average* purchasing power *available* for baked products.

This purchasing power of the masses has been frequently misinterpreted for the baking industry. The consuming power for baked food products should not be determined by the calorie requirements, because the same energy units might be produced from various combinations of the ingredients. For every family income level there is a minimum and maximum amount that can be spent for baked products. And, whenever an increase or decrease takes place in the family income, the budget's share for baked goods will automatically adjust itself. The adjustment at the present time is taking place—*upward* in spite of the current reaction—a golden opportunity for the baking industry. With this present trend, the families may consume less energy units but at the same time they can increase their purchase budgets. This additional purchasing power means that they can pay more although they may consume less, but of better quality.

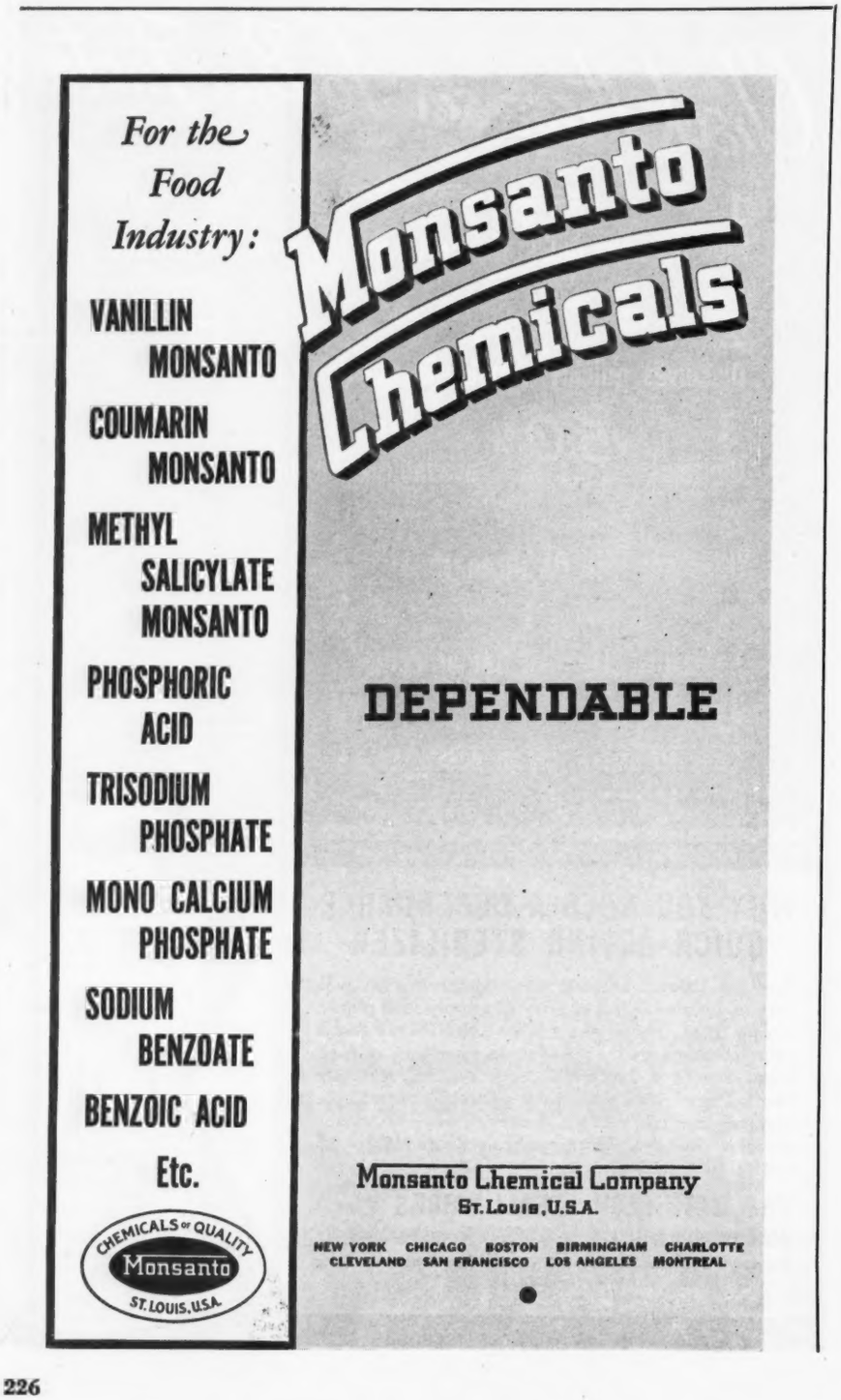
Based upon this principle, the next step for the industry to measure, is how much of the increased earnings are available for baked products, and how much of it must go to cover the increased cost of production. The remaining balance is available for increased quality. This will vary for every state in the Union, being subject to fluctuations due to the prevailing local economic conditions.

It is of the greatest importance to the baking industry to have a definite knowledge of the current changes affecting the potential purchasing power of the masses. Monthly or even yearly information on this subject would give the industry greater service than all the combined unrelated statistics on consumption supplied to them at the present time, because these past consumption records indicate what has already happened, while the purchasing-power potential would show what is still ahead of the industry. Such facts should be presented to the industry in the simplest possible manner, as shown in one of the charts. In this illustration, the potential family purchasing power, available for baked products at the beginning of 1936, has been divided into four groups, with the states in each group recorded.

The difference between the consumption potentials of these states, and the actual consumption, as recorded in the other chart represents the *sales volume the commercial baking industry could still obtain.*

These facts should certainly indicate to the bakers what great opportunities are still ahead of them and, if they should employ the proper means to reach this market, the industry could announce notable progress in the next year or two.

The magnitude of the potential business which is still available to commercial bakers, and where it is located, by States, will be featured in Part II of this article, which will be published in FOOD INDUSTRIES *for May, 1938.*



Quality Control

(Continued from page 187)

be instructed in the variations and blemishes which occur in all natural products such as fruits. vegetables and meats, and must be on the lookout for unusual conditions so that these can be reported and dealt with promptly. Each package must be inspected at the point of filling and with glass packages again at the time of labelling, so that individual variations and blemishes can be detected and eliminated as far as possible before the package reaches the consumer. Whenever any blemish or deviation is detected by the routine laboratory examination, which should have been detected by the inspectors in the manufacturing departments, it is taken up immediately with those directly responsible in order to maintain the proper vigilance in inspection.

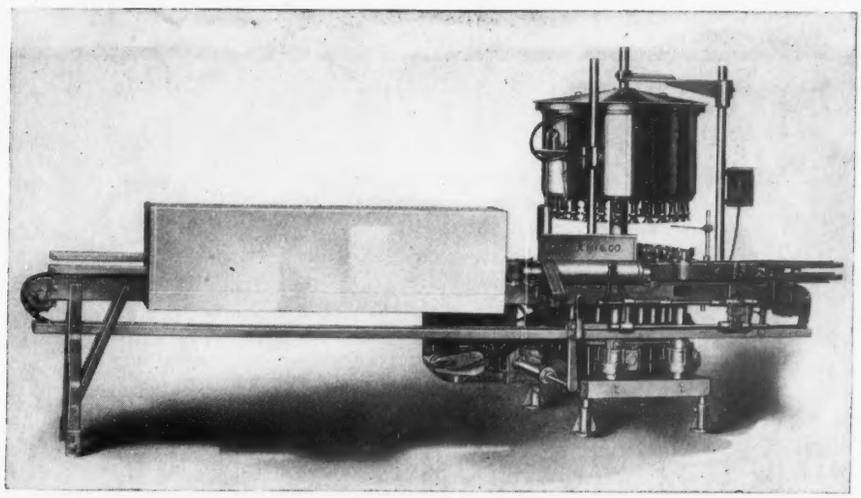
As a further check on the effectiveness of the general and individual aspects of quality control, finished goods stored in the warehouse are thoroughly inspected, for finish of package and quality of contents, at regular intervals. Much can be learned from an intelligent investigation of complaints from consumers or salesmen, which will occur even in the best-regulated factories, and frequently are of assistance in showing up loopholes in the quality control or inspection systems.

The proper identification of packages is important. For canned goods, it is a simple matter to devise codes stamped on the end of the container, identifying the product and the date of manufacturing. Where large runs are made of any particular product in a day, the codes are changed to divide the day's run up into sections. Records are kept in the laboratory of any observations made during each run so that a complete history of each run is available for later checking. With glass-packaged goods, the label is perforated to show the date of production and records are kept in the laboratory identifying the batches or other units used in that day's run. Shipping containers are marked with codes showing date of manufacturing, batch numbers or other identifying markings, to facilitate correct rotation of shipment and identification of finished goods.

The package itself obviously plays an important part in quality and therefore in quality control. The choice of a package involves many considerations—whether cans or glass, cost, appearance and many other factors enter into it. An important feature of the quality control system is to make sure that the packages are properly sealed and handled. There is no point in making fine tomato juice or delicious soups and putting them in cans which are not properly sealed. It is no good making fine preserves and jellies and providing them with hermetic seals and a cooling system to preserve the quality, if the sealing machine is not properly adjusted. It is, therefore, essential to have well-trained operators to keep a careful watch on all closing machines during the operations and for all these engaged in quality control and inspection to make sure seals and closures are properly made.

It can be appreciated that a system of quality control such as here described demands constant alertness and vigilance from all those engaged in production, with a carefully organized system of inspection and a continuous program of technological research and development. No system can be really successful unless it has the support of the entire personnel and it is most important to develop a spirit of team work and co-operation and to instill into the whole organization a sense of pride in the quality of the products they help to manufacture. Quality control is, therefore, the job of one and all.

HIGH SPEED



is Just Half the Story

Even when operating at speeds as high as 300 bottles a minute, this High Speed Horix Catsup Filler fills every bottle uniformly and without air pockets. Patented safety features prevent jamming, breakage and loss of product. Filling valves are protected against damage due to choke-neck bottles.

Horix Rotary Fillers are also made in smaller sizes and in styles suitable for filling chili-sauce, vinegar, fruit juices, soups, syrups, wine, whiskey, for brining and saucing beans, spaghetti, etc. Write today for complete details, stating product to be filled.

HORIX MANUFACTURING CO.
PITTSBURGH, PENNA.
CONVEYORS and FILLERS

New Discoveries

(*Continued from page 210*)

the use of a leavening agent composed of baker's yeast, mesophilic bacteria of the *Clostridium butyricum* type from corn meal, and thermophilic bacteria from cane or beet sugars.

The bacteria-yeast cultures are made in a continuous manner; each organism group is grown separately and under conditions most suitable for propagation of pure cultures, high gas production, and flavor development. They may be separated from their growing mediums in a compressed-mass mixture or used in the dough mix as liquid suspensions, usually in the approximate ratio of 1 to 1 of bacteria and yeast cells.

Results obtained by their use are set forth to be: (1) doughs mixed and proofed at usual temperatures give a bread with a superior mild flavor and greater oven spring than when yeast alone is used; (2) doughs mixed at 110 deg. F. give a bread of higher flavor, higher moisture content, and less fermentation loss than ordinary yeast bread; (3) doughs mixed and proofed at 120 to 130 deg. F. give a bread leavened by bacteria after the first 30 min. after mixing and containing the vitamin B content of the yeast used. In this third instance the yeast provides for an anaerobic condition of the yeast, a stimulating action upon the bacteria, and a supply of vitamins in the bread. "Straight dough" or "sponge-dough" breads may be made equally well.

The patent was granted to William L. Owen, Baton Rouge, La., and assigned to Lummus Co., New York, N. Y.

Thought for FOOD

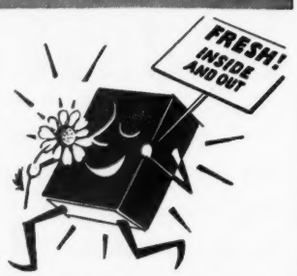
EXPERIENCE—NOT FOR SALE

Extract manufacturers will find a price-tag on Rossville Alcohols, but the priceless experience of Rossville representatives is available for the asking. These men, backed by the extensive facilities of the Research, Production and Engineering Departments, can help on all technical problems involving the use of alcohol, as well as assist alcohol users in complying with all regulations governing the withdrawal and use of alcohol in all forms.

Mailed Free "ALCOHOL TALKS"—*An educational series on alcohol.*

QUALITY INSURANCE

It costs money to put quality into a food product. Lacquer-coated packages help preserve that quality throughout the phases of distribution, warehousing, and retail sale. Furthermore, lacquer-coated packages provide quality appearance of display, another form of insurance in marketing quality food products.



Send for elaborate portfolio entitled
"LACQUER COATING FOR MODERN MERCHANDISING"

PREMIUMS—BUT NOT AT A PREMIUM!

Dispensers and home containers molded of colorful Resinox can, and do serve still another purpose —that of an advertising reminder to Mrs. Housewife. She can taste the product but not the Resinox. Further, Resinox pieces are inexpensive, strong, non-fading, non-bleeding, and are available in a wide variety of attractive colors.

An instructive booklet on molded products is yours for the asking.

COMMERCIAL SOLVENTS CORPORATION
New York Central Building, New York, N.Y.

BEVERAGES

Caramelized Malt

A MALT PRODUCT which has no bitter flavor and can be used in a variety of ways in baking and in special dietary preparations is made from green malt by a caramelizing process. The process is protected by German Patent 648,631 (granted Aug. 6, 1937, to Felix Albrecht, Munich) and is described as a multiple-stage heat treatment of moist green malt. The moisture content of the malt is first adjusted to between 60 and 70 per cent. The first heating stage is at 65 to 75 deg. C. (149 to 167 deg. F.) and is continued until all the starch is degraded. The next stage is at 80 to 90 deg. C. (176 to 194 deg. F.) and is continued until any remaining starch is fully dextrinized. The final stage is vacuum drying at 100 deg. C. (212 deg. F.). Under this treatment the malt grains remain plump and the husks easily separable. The caramelization which is begun in the first stages of the heat treatment is completed in the final vacuum drying.

CANNING AND PRESERVING

Fruit Juices Pasteurized Without Loss in Quality

ORANGE, grapefruit, and pineapple juices may, as provided for in U. S. Patent No. 2,104,415, retain their normal fresh color, vitamin content, and volatile aromatics although heated to pasteurizing temperatures in the course of processing.

The pasteurization is accomplished in a closed system in which the oxygen content of the juices and of the air in the pasteurizers is washed out by a current of inert gas. This may be nitrogen, carbon dioxide or a simi-

lar non-oxidizing gas. During the early stages of heating the juices to pasteurizing temperature the oxygen-containing air in the juice is driven off and out of the kettle so that the juices are in a non-oxidizing atmosphere when pasteurizing temperatures are reached.

Heat is applied externally to the pasteurizer kettle by means of heated jacket. Aromatic volatiles and water vapor swept out of pasteurizer are separated from the gases in a condenser and are returned to the juices in the pasteurizer. The pasteurizer may be a single jacketed kettle operating on an intermittent batch basis or a battery of three or more kettles operating continuously so that the flow of juices and flow of gas are counter current to each other and under a pump pressure to form a spray.

Claims in the patent hold that pasteurizing temperatures of 150 deg. F. are possible without deterioration in color, vitamin content, and palatability of the juices that are preserved by this method.

In the multi-kettle, counter-current system the rise in temperature of the juice is progressive as the juices move from kettle to kettle. The volatiles and water vapors are carried with the gases to the successively cooler kettles and are condensed or washed out of the gases by the spray of incoming cooler juices.

The patent covering the process was granted Jan. 4, 1938 to Austin Morris Davies, Jamaica, N. Y.

DAIRY PRODUCTS

Instant Whipping Of Cream by Aeration

INSTANT WHIPPING is based on the principle that the solubility of a gas in a liquid increases directly with the partial pressure of the gas. Because of this physical-chemical principle, whipped cream is formed even when whipping conditions are unfavorable. A mix is prepared by adding 6 per cent sugar to fresh pasteurized cream of 35 per cent fat content, flavored with vanilla. This mix is charged under an 80-lb. gas pressure into small, steel syphon bottles. The gas used is nitrous oxide. At this pressure 7 to 8 oz. of mix produces apabout one quart of the whipped cream.

The charged bottles are delivered to soda fountains, restaurants, or homes. Instant-whipped cream is then served by momentarily opening the valve of the bottle. The whipping is produced by the release of the gas which was dissolved into the cream at high pressure and comes out of solution in the form of small gas cells uniformly distributed through the body.

Some of the advantages of this method are: dispensing of small amounts of whip in a sanitary manner, elimination of waste, large overrun independent of fat content and elimination of stabilizers.

Digest from "Instant Whipping of Cream by Aeration," by Getz, Smith, Tracy and Prucha, *Food Research*, 2, 409, 1937.

Why Cream Churns to Butter

RAHN'S THEORY of the churning of butter, i.e., that it is a case of the breaking of an emulsion by the churning action, has received further substantiation. The emulsion-breaking is due to the preference of the proteins for an air/liquid interface rather than a fat/water interface. If surface-active materials are added to cream, which prevent the accumulation of milk proteins in the foam, the cream cannot be churned to butter. Thus, 1 part in 1,000 of saponin added to 50 per cent cream prevents butter forming even after hours of churn-

IF YOU HANDLE BARRELS AND DRUMS DO IT SPEEDILY—SAFELY

The Colson Way

WITH Colson's new Universal Drum Truck, more loads can be handled because operator fatigue is lessened. No lifting is necessary to load the truck. The trucker merely maintains balance and rolls the truck.

Safety is assured because proper balance of the load eliminates strain. The adjustable hook is quickly set in the proper position for barrels or drums 24" to 40" high. The shape of the handles protects the operator at all times. Write for descriptive folder.

COLSON

LIFT JACK SYSTEM HANDLES ALL LOADS

For barrels, boxes, bags, bales—all forms of packages—get full facts on Colson Lift Jack System—the system that cuts handling costs—increases storage space—that makes every load a live load. An investment as small as $150 will start you with one lift jack and several platforms. You add to your equipment as the needs require—paying for the equipment in savings that you make. Write for the booklet "Colson System of Materials Handling."

THE COLSON CORPORATION

3718 CEDAR STREET • ELYRIA, OHIO

ing, whereas it would "come" in 60 seconds without the saponin.

Digest from "Churning for Butter," by Clayton and Morse, *Nature*, 139, 717 (1937). (Published in England.)

MEATS AND FISH

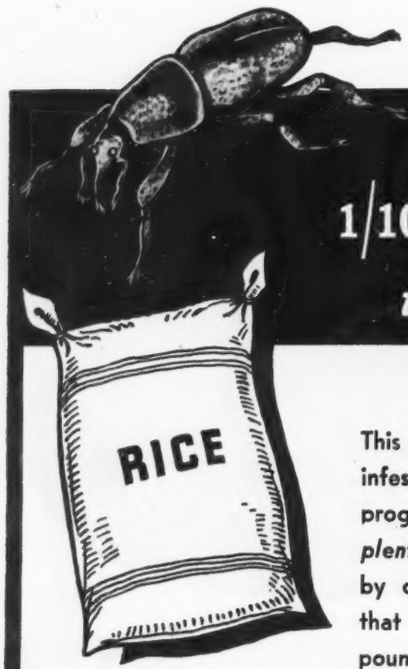
Skinless Sausages

ACCORDING TO French Patent 819,739 (granted Oct. 26, 1937, to Otto Mäder of Germany), a skinless sausage can be conveniently and inexpensively prepared by shaping the sausage mix, keeping it in a temporary skin until it has hardened sufficiently to be sliced, stripping off the temporary skin and coating the stripped sausage with a self-setting composition which can be readily removed as required. A composition which meets the need quite satisfactorily and contains no ingredient which is objectionable in any way is prepared from whiting, aspic, glycerin, salt and water. When this mixture is applied to the sausage it quickly sets to a solid jacket which can be taken off easily at any time.

Review of Literature on Meat for 1936

A COMPREHENSIVE REVIEW of the world's scientific and technical literature on meat for the year 1936 is presented in this excellent study from the research laboratories of Swift & Co.

"Review of Literature on Meat for 1936," by Newton, Biskur, Ramsbottom, Robinson and McLean. *Food Research* 2, 581 (1937).



Would you pay
1/100 CENT PER POUND
to kill this bug?

This is the Rice or Black Weevil which infests rice. These pests and their progeny cost the rice producers *plenty*. Investigation in one rice plant by our engineers disclosed the fact that it would cost 1/100 cent per pound for sufficient LIQUID HCN to obtain a *complete kill* in their bulk rice and 2/100 cent per pound in their packaged rice.

You may produce, or use, such products as rice, flour, raisins, dates, figs, nuts, cocoanut and other foods which are subject to insect infestation. If so, write us for an estimate of the cost of obtaining a complete kill on the particular product you handle.

LIQUID HCN is an all-purpose pest destroyer. It is a powerful, concentrated, economical and efficient fumigant. Completely controls all insects which infest stored products, and kills rats and mice.

The American Cyanamid Company is the only manufacturer of HCN in all its modern forms — LIQUID HCN, ZYKLON DISCOIDS and CYANOGAS.

AMERICAN CYANAMID & CHEMICAL CORPORATION
Insecticide Department
30 ROCKEFELLER PLAZA, NEW YORK, N. Y.
KANSAS CITY, MO. AZUSA, CALIF.

OILS AND FATS

When Studying The Spoilage of Fats—

SPOILAGE OF FATS involves formation of ketones, and the reaction is not necessarily photochemical because fats spoil even when kept in the dark. The customary methods of rendering lard and other fats cause some ketonization, which may be looked upon as incipient spoilage. Solvent extraction methods have been tried for preparing pure fats from animal tissues, in order to obtain pure ketone-free fats for research on spoilage. Unfortunately, the solvents commonly employed almost invariably contain a little acetone. The quantity may be very small, but the fat tends to retain the acetone when the solvent is removed, and thus ketone is accumulated in the extracted fat. Extreme care must, therefore, be taken to remove the last trace of acetone (or any other ketone) from the selected solvent. Ether requires about ten extractions with distilled water to remove the last trace of acetone. The water left in the ether by these washings does no harm in the extraction of the fatty material with ether. Other solvents which have been found to contain acetone include alcohol, carbon tetrachloride, chloroform and gasoline. Refined benzene and octane were found to be ketone-free.

Digest from "Chemistry of Fat Spoilage. 2. Ketone Reaction in Solvents," by F. Kiermeier and K. Tuufel, *Fette und Seifen*, 44 508 (1937). (Published in Germany.)

Condemns Bleaching of Fats

BLEACHING EDIBLE FATS, whatever its esthetic merits, is not a treatment to be recommended from the dietetic standpoint. Bleaching can only be effective by removal of the fat-soluble coloring matter, and this is precisely the substance which imparts to natural fats or oils much of their vitamin potency. A conspicuous example is carotin, the yellow hydro-carbon which colors so many natural fats and is the

chemical percursor of vitamin A.

Holland and Denmark, where most of the butter is exported and many of the people eat margarine, have had high incidence of vitamin-A deficiency in the population, and efforts are now being made to remedy the situation by developing vitamin-enriched margarine. Bleaching and other unnecessary refining of edible fats should be avoided for the sake of public health.

The unsaponifiable matter, like the fat-soluble coloring matter, is an important carrier of nutritional values such as provitamin A (carotin), provitamin D and ippovitamins. While these substances are not especially heat-sensitive and survive the ordinary hazards of cooking rather well, high temperatures such as are used in roasting, browning and baking cause vitamin losses even though the vitamins are not actually destroyed. It is a general truth that vitamins in their natural environment in foods are less sensitive to heat than when isolated and purified, and for this reason fats or oils may retain their nutritional value through treatments destructive to pure vitamins or provitamins.

Digest from "Refining Fats: Bleaching as a Nutritional Problem," by W. Halden, *Fette und Seifen*, 44, 346, 1937. (Published in Germany.)

QUALITY CONTROL

Bacteria on Paper Containers

THE NUMBER of bacteria found on paper containers for ice cream depends principally on how they are kept in the retail store. Keeping them in open cupboards, close to the floor, naturally allows dust to settle in them and bring bacteria with it. The cylindrical type of container with a close fitting top has far less bacteria than the square, folding-box type. It is usual with the latter to stack them open at the top, and the top box normally has most microbes. They should be stacked inverted to prevent contamination. Paraffined paper plates stacked upside down were practically sterile.

Some variation was found between the products of different manufacturers, some being consistently almost sterile. Others were too havily infected in some cases with bacteria probably of sewage origin.

Digest from "Numbers and Types of Bacteria Isolated from Paper Ice Cream Containers," by M. L. Speck and L. A. Black, *Food Research*, 2, 567, 1937.

Bacteria in Frozen-Pack Vegetables

FRESH VEGETABLES vary widely in microbial count. Ear-worm infestation in corn, or heavy rain before harvesting, increases the number of bacteria tremendously. When green and wax beans, sweet corn and lima beans are washed, scalded, frozen and stored at 0 deg. F. for five to seven months, there is an average decrease in bacterial count of from 94.6 to 99.8 per cent. Counts vary rather widely, being highest in sweet corn, even up to a million per gram after storage. Size of container has no effect.

High counts can be avoided by using the highest quality of products, keeping these clean and cool during packing, and freezing as soon as possible after harvesting. Frozen foods are essentially fresh foods, so in every stage of handling the rules for sanitary control necessary for fresh foods apply equally strongly. To maintain quality in preparation for the table, cooking should start without defrosting. Place the solidly frozen vegetables in boiling water and take the cooking time from the moment the thawed mass begins to boil.

FOR LIFETIME DIVIDENDS

Dry-Zero Insulation

IS YOUR BEST INVESTMENT

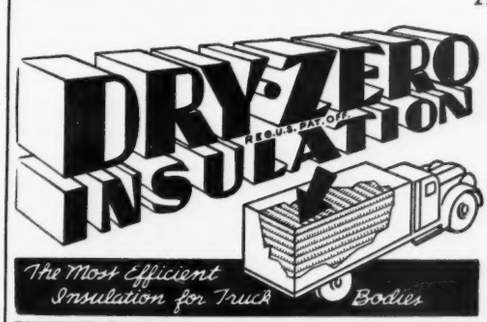
● Your truck body insulation purchase is a capital investment which should pay dividends for life. It is for this reason that thousands of truck owners hauling perishable food products always buy Dry-Zero.

Dry-Zero is so extremely light that it saves dead-weight and, therefore, ton-mile operating expense. Since it is so efficient, less thickness is required to give adequate protection. This means thinner walls and additional space for cargo. A third saving is the decreased refrigeration requirements resulting from the high insulating efficiency of Dry-Zero.

These savings are annual cash dividends on your Dry-Zero investment. They mean that less money is required for yearly operation. They represent cash benefits which you gain because you were wise enough to choose Dry-Zero.

Ask Your Body Builder

Above is illustrated another meat and dairy products truck in which Dry-Zero insulation was used. This body was built for Swift & Company by Erlender-Platt Sales Corporation of Chicago. Ask your body builder to explain the many advantages of Dry-Zero before you insulate your next truck.



DRY-ZERO CORPORATION • CHICAGO, U. S. A. • TORONTO, CANADA

Digest from "Types and Survival of some Microorganisms in Frozen-pack Peas, Beans and Sweet Corn Grown in the East," by Helen F. Smart, *Food Research*, 2, 515, 1937.

Expressing Flour Quality In Three Dimensions

TO EXPRESS the baking quality of a flour, a three-dimensional graph appears to be the best method, in which mixing time, fermenting time and bread quality are the three dimensions. By building a crude sort of model from wooden rods set upright in a board at the proper intersection of the coordinates of mixing and fermenting times, the tops of the rods indicate a curved surface that conveys a clear understanding of the essential baking characteristics of the flour under test.

This three-dimensional graph conveys so much valuable information that it appears to be a very questionable practice to subject all flours to a single fixed condition of mixing and fermenting in the standard baking test. If this new method is used, the laboratory can tell the baker, for example, that a given flour requires a long mixing time, a short fermentation, a light dose of oxidizing improver, a small amount of malt and much water. And the baker can then make the necessary adjustments in the shop procedure without likelihood of impairing quality during the first trials with a new lot of flour.

Digest from "The Scientific Basis for Experimental Baking Tests," by M. C. Markley. *Cereal Chemistry*, 14, 834, 1937.

STARCH

Improvements in Potato Starch Manufacture

MODERN MACHINERY and mass production methods have increased the yield and lowered the price of potato starch, but part of the cost has been the necessity of sacrificing the old gravity separation systems which classified the starch as it settled. Gravity separation in trays has not been entirely superseded, but is still employed by producers who prefer the high, medium and low grade (coarse, medium and fine grained) starch products to the modern product in which the grains are mixed just as they were in the potato.

With modern methods and equipment, 94 per cent of the starch in potatoes can be recovered. The losses represent starch carried away in the crude fiber and the steep water.

In the matter of drying, a choice had to be made between tunnel dryers, which require much manual labor, and the continuous (belt conveyor) steam dryers, which are automatic but give a poorer yield.

But a circular plate drier which is automatic and highly efficient has recently been developed. This drier uses hot air as the heating medium. Centrifugal drying has also been greatly improved recently by automatic dischargers, which operate while the machine is running and save both time and labor. With electrical control, these dischargers are entirely automatic.

A German producer has lately departed from the old system of separation by dewatering the mixture of starch and crude fiber pulp before separating pulp and starch, instead of removing the pulp first and then dewatering the starch. The advantage is that the water, which contains oxidation-sensitive proteins, is thus prevented from causing discoloring of the starch.

Digest from "Starch Mills," by Henri Nouveau, *Chimie et Industrie* 39, 40, 1938. (Published in France.)

MISCELLANEOUS

Present Status of Synthetic Protein Substitutes

MAN HAS NOT YET synthesized a true protein. And the complexity and variability of the possible molecular structures are so incomprehensively numerous that duplication of any given natural protein is a task far beyond the range of the syntheses which have accomplished so much in dyes, perfumes and drugs. Indeed, nature itself does not always build to the same pattern, and variations occur even in the same animal, as in the milk of one cow.

But in spite of all this, some important progress has been made in the matter of artificial nitrogenous substances which may serve as protein substitutes. It is true that nature is enlisted in the manufacturing process, since micro-organisms are employed, and most of the progress so far has been in the simpler and less exacting field of feed for animals. Nevertheless, there is a trend toward factory production of edible protein substitutes.

Research has shown that the bacteria of the rumen in cattle can produce amino acids and proteins from non-protein material, but there is yet much to be learned about the best materials to use, the nutritional needs of ruminant animals and the optimum production conditions. Again, to approach the problem of human food, yeasts can be fed on sugar mashes made by hydrolysis of wood. Here, again, there are many unsolved problems in the path of the investigator.

The factors which influence yield, flavor, nutritional value and costs must be evaluated. It is known that cows, pigs, sheep and horses can digest yeast made from wood sugar, so there is a foundation on which perhaps a future process of food manufacture may be built.

Digest from "Artificial Production of Nitrogenous Protein Substitutes," by Paul Ehrenberg, *Angewandte Chemie*, 50, 773, 1937. (Published in Germany.)

Vitamins in the Diet

RECENT RESEARCH on vitamins has not altered the established principle that vitamins are preferably taken into the body in their natural sources, *i.e.*, in a well balanced diet. rather than by artificial administration. The occasional exceptions to this rule are becoming clarified and established on a broader basis of exact knowledge than in the past as the distinctions are more clearly defined between the dietetic and therapeutic uses of vitamins.

Thus, brown rice has special merit in the diet but does not keep so well as polished rice. Hence, in thickly populated Oriental regions, where rice is a staple food, a problem exists, often best solved by supplying aneurin in some form other than in brown rice.

Again, as between white and wholewheat bread, there is a distinct difference (to which pregnant women are particularly sensitive), but in a carefully controlled and balanced diet the needed vitamin is supplied from other sources and the difference becomes negligible.

The best canning practice does much to conserve vitamin values in foods, and it has been shown in Holland that canned spinach is much richer in vitamen C than is the average home-cooked fresh spinach. Canned and dried fruits and properly prepared fruit juices also help to maintain the vitamin value of modern diets.

The food processing industries have accomplished much along this line, but they have a responsibility which must not be neglected. It must be remembered that there undoubtedly remain important vitamins to be discovered, and there is a wide opportunity for progress and improvement in the best utilization of those vitamins which are already known.

Digest from "Vitamin Research and the Chemical Industry," by B. C. P. Jansen, *Chemisch Weekblad*, 35, 4, 1938. (Published in Holland.)

BOOKS RECEIVED

BUSINESS AND THE ROBINSON-PATMAN LAW. Edited by Benjamin Werne. Published by Oxford University Press, 114 Fifth Ave., New York, N. Y., 1938. 296 pages; 6x8¾ in.; cloth. Price, $2.50.

Sixteen specialists in the field of distribution contribute their thinking to the solution of problems arising out of the application of the Robinson-Patman Act, this book being in the nature of a symposium. These specialists cover the historical background of this legislation, the economic factors involved, legal analysis of the legislation, distribution under the Act, marketing (with a section on the food industry) and the effect of two pioneer decisions under the Law (the Kraft-Phenix Cheese Corp. and Bird & Son, Inc. cases). The book also contains some interesting "unofficial" charts of population, prices, distribution of manufacturers' sales, sales by type of operation, ratio of chain store sales to total retail sales, and importance of the 48 states as to population, retail sales and income.

CANNING PRACTICE AND CONTROL. By Osman Jones and T. W. Jones. Published by Chemical Publishing Co. of N. Y., Inc., 148 Lafayette St., New York, N. Y., 1937. 254 pages; 6½x9¾ in.; cloth. Price $10.

This volume, dealing chiefly with laboratory work as carried out in a British cannery, contains much useful information for the guidance of the laboratory worker. In particular, its admonition that the chemist is a watch dog, but not a policeman, is good advice to all young industrial chemists everywhere.

It is, however, a chemist's book, containing much detailed information on how to organize and conduct laboratory tests but, unfortunately, not very much on how to interpret the laboratory analyses, either chemical or bacteriological. Judging by the absence of all but a single reference to thermophilic spoilage, and no reference at all to the need of proper temperature control or cooling of cans to avoid spoilage from this source, it is possible that British canners have been spared many of the spoilage problems that have beset American canners.

Also it is obvious that the authors have only had experience with small cans and have not faced the problems attendant to large cans, such as No. 10's. The volume would have been strengthened had it drawn more fully from the many publications of the National Canners Association (U. S.) and from the research divisions of the large can companies in the United States. For example, despite the fact that one-eighth of the book is devoted to water for the canning factory, no mention is made of the cause of off-flavors by chlorinated water supplies that contain minute amounts of gas house wastes.

The book erroneously associates E. W. Duckwall: "Canning and Preserving" (1905) with the National Canners Association, doubtless due to the fact that he called his private establishment in Aspinwall, Pa., by the name, The National Canner's Laboratory, long before the National Canners Association was organized.

Though this reviewer can give only faint praise to the volume, it must be admitted that it is the first of its kind and, if future revisions are published, it could be made a very useful and comprehensive work.

BEER FROM THE EXPERT'S VIEWPOINT. By Robert A. Wahl and Arnold Spencer Wahl. Published by Wahl Institute, Inc., 145 N. Clark St., Chicago, Ill. 1937. 506 + xxxi pp.; 5⅜x8¾ in.; fabrikoid; illustrated. Price $12.

As the first of a four-volume treatise on brewing, the Wahl Handy-Book of the American Brewing Industry, Vol. I, acquaints the reader with beer as a finished product—its composition, its technology, its defects as well as its normal good quality characteristics, its nutritive value, its perishability and, for good measure, its relation to the political and economic progress of the world. Also included are chapters on the legal and Food and Drug Administration aspects of beer and its production.

In fact, a single volume contains the equivalent of six books on the subject of beer. This volume (1) defines what beer is, (2) gives its history, (3) elaborates upon its good drinking qualities, (4) reviews its legal relationships, (5) discusses its nutritive, social and moral aspects, and (6) records the technical progress and research developments that characterize its production in the United States. Many of the technical and research developments cited are personal contributions to the brewing industry by the authors of this treatise.

FLUORINE INTOXICATION: A Clinical-Hygienic Study; With a Review of the Literature and Some Experimental Investigations. By Kaj Roholm. Published by Arnold Busik, Copenhagen, and H. K. Lewis and Co., Ltd., London, 1937. 375 pages and 47 plates. Price, 20 shillings.

Fluorine compounds sometimes occur in insecticides. Also, in some localities fluorine compounds occur in drinking water, or in phosphate rock used as fertilizer, or occur in the soil. Since all fluorine compounds are toxic to man and to animals, their presence in or on any food should be carefully avoided. It is for this reason that the use of cryolite and other fluorine-base insecticides is forbidden in the United States.

While fluorine poisoning is not a present danger in this country, it will be well for food technologists and others to keep in mind the existence of this book. It is the only work available in English, at the present time, which covers existing information on the subject. Should an outbreak of fluorine intoxication occur, it will prove extremely useful.

WESTON-LEVINE VITAMIN CHART, SEVENTH REVISION. By Roe E. Remington. Published by the author at 280 Calhoun St., Charleston, S. C., 1937. 4 pages; 8½x11 in.; paper. Price 10 cents. The chart, which includes composition and properties of the vitamins and their sources and occurrence in foods, has been revised to include the results of recent researches.

THE SILVER WEDGE—The Sugar Beet in the United States. Published by the United States Beet Sugar Association, Washington, D. C., 1937. 62 pages; 6x9 in.; effectively illustrated; paper. Free. A little booklet containing a lot of interesting information about beet sugar, the sugar beet and sugar manufacturing, including a flow sheet giving "a story of sugar."

THE CORROSION OF TIN IN NEARLY NEUTRAL SOLUTIONS. By T. P. Hoar. Reprinted from *The Transactions of the Faraday Society*, by International Tin Research and Development Council, 149 Broadway, New York, N. Y., 1937. 16 pages; 6x9¾ in.; paper. Free. A scientific treatment of a subject important in the processing and packaging of many foods. Water, milk and certain canned foods are "nearly neutral" solutions.

PATENTS

Pineapple Juice Converted Into Brandy Following Heating to a Temperature of From 140 to 212 Deg. F. to Coagulate the Albumins—Chambers L. Crutchfield, Wailuku, and John P. Foster, Paia, Territory of Hawaii, to Maui Pineapple Co. Ltd., Paia, Territory of Hawaii. No. 2,103,449. Dec. 28, 1937.

Bread Dough Baked By Heat of Electrical Resistance of Dough—John Kremer, Southport, Conn. No. 2,103,469. Dec. 28, 1937.

Cheese Made in Molding Vat Divided by Platforms and Spacer Walls to Receive Curd and Shape it Into Blocks of Equal Size and Shape Supported by the Individual Platforms—Raymond Miollis, Barron, Wis. No. 2,103,545. Dec. 28, 1937.

Varicolored Casein Produced by Subjecting Unconverted Rennet Casein Body Material Mixed With Particles of Converted Casein of Contrasting Colors to Pressure and Elongation—George Morrell, Muskegon, Mich., to George Morrell Corp., Muskegon Heights, Mich. No. 2,103,546. Dec. 28, 1937.

Chocolate Stabilized by the Addition of a Small Porportion of An Oxidized Mono-unsaturated Di-saturated Glyceride—William Clayton, Sydney Back, James Frederick Morse and Robert Ian Johnson to Crosse & Blackwell Ltd., London, England. No. 2,-103,612. Dec. 28, 1937.

Fruits Pitted While in Frozen State and Then Packed in Sugar Syrup for Cold Storage—Wladimir M. Zarotschenzeff, Englewood, N. J., to Z Pack Corp. No. 2,103,925. Dec. 28, 1937.

Packaged Ice Cream Retailed in Vending Machine Refrigerated by Solid CO_2—Wilhelm Hamel, to Carp's Handelsbureau voor Aviatiek en Scheepszaken, N. V., Amsterdam, Netherlands. No. 2,104,034. Jan. 4, 1938.

Bread Made by Using a Combination Bacteria-Yeast Culture Process—William L. Owen, Baton Rouge, La., to Lummus Co., New York, N. Y. No. 2,104,054. Jan. 4, 1938.

Animal and Vegetable Fats and Oils Made Resistant to Rancidity by Incorporation of a Phenol Derivative—George H. Latham to E. I. du Pont de Nemours & Co., Wilmington, Del. No. 2,104,084. Jan. 4, 1938.

Sliced Bread Packaged Into Less Than Loaf Portions—Gustav C. Papendick, University City, Mo. No. 2,104,095. Jan. 4, 1938.

Dough Made in Roll Form and Divided Into Sliced Portions While Traveling on a Belt Conveyor Under Spaced Cutters—Joseph C. Menapace and George Kallfelz, Syracuse, N. Y. No. 2,104,205. Jan. 4, 1938.

Fatty Materials Stabilized Against Rancidity by the Incorporation of a Small Quantity of Phosphorous Acid or its Acid Acting Derivatives—Albert S. Richardson, Wyoming, Ohio, to Proctor & Gamble Co., Cincinnati, Ohio. No. 2,104,242. Jan. 4, 1938.

Dough Portions Subjected to a Kneading and Degassing Treatment During Proofing Preliminary to Panning—Carnot R. Wagener and Albert J. Faulhaber, Cincinnati, Ohio. No. 2,104,282. Jan. 4, 1938.

Fresh Fruit Juices Pasteurized and Freed From Oxygen By Passing Through Successive Series of Chambers at Progressively Higher Temperatures Counter-Current to the Movement of an Inert Gas Through the Heat Treating Chambers—Austin Morris Davies, Jamaica, N. Y. No. 2,104,415. Jan. 4, 1938.

Dough Divider—Fred Marasso to Union Machinery Co., Joliet, Ill. No. 2,104,432. Jan. 4, 1938.

Can Filling Machine—Charles H. Ayars, to Ayars Machine Co., Salem, N. J. No. 2,104,-445. Jan. 4, 1938.

Butter Churn—Albert C. Hougland to Crane Co., of Minnesota, St. Paul, Minn. No. 2,104,462. Jan. 4, 1938.

Canned Food Heat Treated in Retort Fitted With a Can Transfer Valve Unit Operating Through a Vertical Plane—Herbert Dan Galvin, Ewell, England, to L. C. Engineering Supplies Ltd., London, England. No. 2,104,-514. Jan. 4, 1938.

Smoked Salt Made Resistant to Caking by Addition of a Non-Toxic Moisture Holding Alkaline Earth Chloride—Rudolf Lehmann, to Pennsylvania Salt Manufacturing Co., Philadelphia, Pa. No. 2,104,619. Jan. 4, 1938.

Caramel Cut Into Strips by Knives Plated With a Nonferrous Metal to Prevent Sticking—Philip F. Putney, Newport, N. Y. No. 2,104,623. Jan. 4, 1938.

Milk Irradiated by the Effect of Ultra Violet Energy Striking the Milk at An Angle Between 30 to 50 Deg. From Parallel—George C. Supplee, Bainbridge, N. Y., one-half to Borden Co., New York, N. Y., one-half to National Carbon Co., Inc. No. 2,104,681. Jan. 4, 1938.

Vanillin Made From Ligno-Cellulose, Crude Lignin Extract, or a Lignin-Sulfonic Acid Compound by Treatment With Water and Alkaline Metal Hydroxide Under Pressure—Lloyd T. Sandborn, Wausau, Wis., to Marathon Paper Mills Co. and Guy C. Howard Co., Rothschild, Wis. No. 2,104,701. Jan. 4, 1938.

Fruit and Vegetable Juices Preserved Against Deterioration by Deaerating and Pasteurizing Within a Period of 6 to 8 Seconds While in a Thin Ribbon or Film Form, Cooling Immediately to 170 to 180 Deg. F. and Sealing in Containers Before Cooling to Room Temperature by Prompt Treatment With Cold Water Sprays and Immersion in Tank of Cold Water—Frederick C. Blanck, Washington, D. C., Theodore L. Swenson, Chevy Chase, Md., Hugh H. Mottern, Pullman, Wash., and Harry E. Coresline, Silver Springs and Elnathan K. Nelson, Sligo Park Hill, Md., to the free use of the people of the United States of America. No. 2,104,710. Jan. 4, 1938.

Beet Sugar Solutions Purified by Treatment With Ammonium Sulphite Following Liming, Removal of Precipitate and Adjustment of Hydrogen Ion Concentration—George E. G. von Stietz, Berkeley, Calif., to Shell Development Co., San Francisco, Calif. No. 2,104,959. Jan. 11, 1938.

Poultry Defeathered and Put in a Finished Dressed State After Passage Through a Molten Wax Bath—Alfred W. Bruce, Ottumwa, Iowa. No. 2,195,107. Jan. 11, 1938.

Starch Separated From Corn in a System that Permits Reuse of All Water Except the Steep Water, Counter Current Washing of Starch in Centrifugals, and Reuse of Water From First Centrifugal for Steeping—Alfred H. Kelling, Oak Park, Ill., to International Patent Co., Wilmington, Del. No. 2,105,217. Jan. 11, 1938.

Starch Converted by Process in Which the Purified Bone Char Wash Water is Reused in Subsequent Starch Conversion—Rush O. McCoy, Berwyn, Ill., to International Patent Development Co., Wilmington, Del. No. 2,-105,221. Jan. 11, 1938.

Low Salt-Content Meat Extract Concentrate Combined With Mono-Sodium Glutamate, Readily Soluble Albumen and Ethyl Alcohol to Keep Albumen in Soluble State—Fanny Matlack Godfrey, Tarrytown, N. Y., and Robert Wentworth Floyd, Bloomfield, N. J., to Fanny Matlack Godfrey. No. 2,105,477. Jan. 18, 1938.

Free-Fatty-Acid Content of Rendered Fat Reduced to not More Than 0.05 Per Cent by Treating Fat With Activated Carbon and Neutralizing Agent in Presence of Water—John P. Harris, Wilmette, Ill., and William Arthur Welch, Tyrone, Pa., to West Virginia Pulp & Paper Co., New York, N. Y. No. 2,105,478. Jan. 18, 1938.

Spray Residues Removed From Fruit by Wash Containing Hydrochloric Acid and an Alkali Metal Salt of a Sulphonated Phenol—Harry C. McLean and Albert L. Weber, to Endowment Foundation, New Brunswick, N. J. No. 2,105,606. Jan. 18, 1938.

Bakery Products Wrapped in a Transparent Cellulose Sterilized Against Mold Growth by Heat Treatment in a Bake Oven—Louis D. Haas to W. E. Long Co., Chicago, Ill. No. 2,105,648. Jan. 18, 1938.

Iron Content of Wine Reduced to Less Than Six Parts Per Million by Treatment With an Insoluble Ferricyanide Compound—William E. Ramage, Berkeley, Calif. Nos. 2,105,700 and 2,105,701. Jan. 18, 1938.

Molasses and Sugar Syrups Reduced in Stickiness but not Thickened or Solidified by the Addition of an Alkaline Reagent—Lawrence W. Lewis, Beverly Hills, Calif. No. 2,105,745. Jan. 18, 1938.

Zein Extracted From Maize Protein With 92 to 93 Per Cent Ethyl Alcohol at 55 to 65 Deg. C. to Give a Stable Solution at a pH of 6.0 to 7.0—Lloyd C. Swallen, Terre Haute, Ind., to Corn Products Refining Company, New York, N. Y. No. 2,105,760. Jan. 18, 1938.

Taro Corms Cooked, Peeled and Held at Near Freezing Temperatures for About 30 Hours Preliminary to Slicing, Drying, Grinding and Sifting Into a Flour Form—Gaston J. Ley, John H. Payne and George Akau, Honolulu, Hawaii to the free use of the people of the United States of America. No. 2,105,977. Jan. 18, 1938.

Revolving Tray Bake Oven With Inwardly Inclined Deflectors to Direct Vapor Currents Between Ascending Trays—John Faulds, Oak Park, Ill. No. 2,106,052. Jan. 18, 1938.

Chocolate Milk Drink Made From Chocolate, Water, Corn Syrup, Flour, Salt, Sugar, Flavoring Materials and Milk in a Four Step Processing Method—Bernice Fick to Kroger Grocery & Bakery Co., Cincinnati, Ohio. No. 2,106,089. Jan. 18, 1938.

Dried Powdered Yeast Smoked to Subdue Typical Natural Yeast Flavoring Substances—Curtis P. Freshel to Bakon Yeast, Inc., New York, N. Y. Reissue No. 20,635. Jan. 25, 1938.

Chestnuts Maintained in Prime Condition by Periodic Exposure to High Humidity and Low Humidity Storage Conditions—W. Charles Anderson, Linden, Calif. No. 2,106,-314. Jan. 25, 1938.

Fruit Sorted to Size in a Continuously Operating Adjustable Mechanical Grader—Frank W. Cutler, Portland, Ore., to Food Machinery Corp., San José, Calif. No. 2,106,341. Jan. 25, 1938.

Powdered Cocoa Substitute Made From Peanuts, Red Indian Beans, Loctus Nut, Acorn of the Pasanica, Torreya Nucifera Nut and Walnut After Fat Extraction by Lactic Acid Bacterial Fermentation, Drying, and Grilling—Seiichi Ezaki, Nishiyodogawa-Ku, Osaka, Japan. No. 2,106,372. Jan. 25, 1938.

Biscuit Dough Mechanically Deposited on a Moving Baking Surface in a Spaced Relation so That After Baking, the Product Can be Removed to Form a Helically Wound Tube That May be Cut Into Sections—Marius Ernest Girodin, Quimper, France. No. 2,106,-633. Jan. 25, 1938.

Ergosterol Vaporized and Treated With an Antirachitically Activating Electrical Discharge in Vacuum—Charles C. Whittier, Chicago, Ill. Nos. 2,106,779 and 2,106,780. Feb. 1, 1938.

Means for Giving Vitamin D Properties to Ergosterol in a Vaporized State Under Vacuum—Charles C. Whittier to Nutrition Research Laboratories, Inc., Chicago, Ill. Nos. 2,106,781 and 2,106,782. Feb. 1, 1938.

Soluble Starch Converted to Sugar by Diastatic Action of Yeast During Yeast Growing—John F. Wroten, Baltimore, Md. No. 2,106,784. Feb. 1, 1938.

Chocolate Coated Frozen Confections Made in a Continuous Manner by Chilling Container, Spraying Inside of Container with Chocolate, Filling with Confection Mass and Refrigerating Whole to Harden—Frederick Thomas Krein, Park Ridge, Ill., to Dixie-Vortex Co. No. 2,106,893. Feb. 1, 1938.

Broken Egg Meats Filtered Free From Undesirable Substances Without Incorporation of Large Quantities of Air—Frank D. Lomax, Chicago, Ill. No. 2,107,040. Feb. 1, 1938.

Meat Packaged in Cylindrical Shaped Wet Casing Material Which After Stuffing is Twisted To Stretch the Casing and Compress the Meat Into Symmetrical Form as Casing Dries—Herbert Rumsey Jr., Nutley, N. J. No. 2,107,086. Feb. 6, 1938.

Soy Sauce Made by Partially Hydrolyzing a Protein With an Inorganic Agent in the Absence of Organic Enzymes, Neutralizing the Product Then Formed, and Finally Completing the Hydrolysis of the Proteins With Enzymes Produced by Yellow-Green *Aspergillus flavus-oryzae*—Walter O. Snelling, Allentown, Pa. No. 2,107,133. Feb. 1, 1938.

Frozen Foods Directory

Frozen Food Industry Shows Phenomenal Growth

FROM THE MODEST NUMBER of only thirty-five plants engaged in quick-freezing, as reported on page 188 of April, 1930, FOOD INDUSTRIES, to the huge number reported in this issue is quite an amazing degree of progress for eight years. This is particularly significant in view of the fact that most of these years have been years of business depression.

In the following pages are presented facts and figures about the frozen food manufacturers which have been supplied by the companies concerned and checked back with them. Naturally, "intentions to produce" in 1938 are only indicative of the intended volume, and should not be regarded as actual production figures.

The figures in the succeeding pages represent a certain amount of duplication which cannot be avoided because of the unwillingness of some concerns to break down their totals. Thus if Company A contracts for a given production of frozen food from Company B, then the figures for A will represent a duplication of B's share of A's production. For this reason a small percentage of the figures represent duplication and the total of all individual production figures is, therefore, slightly larger than the total actual production of frozen foods.

» Food Industries will be glad to receive the names and addresses of any firms which have been omitted from this directory.

Frozen Foods Directory

What Is a Frozen Food?

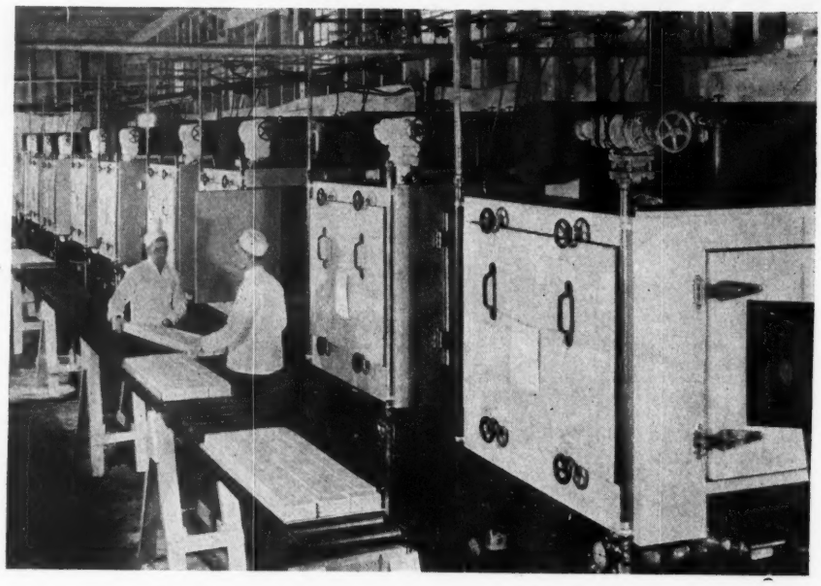
MANY OF THE FOODS whose production is reported here are quick frozen, some are sharp frozen. All of them, however, are frozen foods. But not all foods that are frozen are reported here. For instance, ice cream is omitted, even though it is a quick frozen food, because it is consumed in its frozen form. Ordinarily one does not eat melted ice cream or ice cream mix. Also omitted is frozen cream for this is seldom an article of commerce. Dairy companies often store 40-per cent cream in frozen form, but seldom sell it that way. Usually it is melted, homogenized, and sold in fluid form.

In the same sort of category are certain frozen meats, poultry and fish. In packinghouses, freezing is often done without any idea of selling the meat in frozen form, but merely to preserve it during storage. Another purpose of such freezing is a public health precaution required by the Bureau of Animal Industry. Here pork which is destined for dry sausage is held for two weeks in frozen form, to eliminate the possibility of any pork parasites. (See also D. K. Tressler, FOOD INDUSTRIES, 5, 177 (1933).)

A tremendous quantity of poultry is frozen for preservation during shipment or during storage, but is not sold as frozen poultry. The hundreds of companies doing this type of freezing are not listed in the Frozen Foods Directory.

In lists supplementary to the main table appear the names of many companies which are freezing foods, but which did not supply FOOD INDUSTRIES with details on their operations. There is also a supplementary list naming companies which freeze eggs and one naming concerns which freeze fish. The frozen eggs, of course, are not sold for domestic consumption but are used principally by bakers. The companies named in the supplementary fish-freezing list do not necessarily sell fish in frozen form, but they all freeze for purposes of preservation during storage.

The concept of frozen food which has been employed when gathering these statistics is that it is food which has been preserved by freezing for shipment, sale or distribution in frozen form. One cannot justifiably add the term—for consumption in defrosted or non-frozen form for the reason that many frozen fruits find consumption in frozen form in ice cream.



Here are some of the portable multiplate freezers which are used by Birds Eye Frosted Foods Corp. (see Frosted Foods Sales Corp. in table). These are shipped from place to place where crops are ready for freezing. Packages of food are placed between plates and compressed to obtain proper heat transfer. Direct-expansion of ammonia supplies the refrigeration

In considering the magnitude of the freezing industry as pictured in the Frozen Foods Directory, the assumption must not be made that all of the companies named are "quick freezing." As shall be explained presently, quick-freezing is somewhat of an indefinable term, but it can be said with certainty that many of the companies putting up cold pack products are not doing quick freezing. Here the product is frozen in barrels, kegs or large cans—a process which would hardly be quick at any temperature.

How Fast Is Quick?

For the benefit of those who still believe in the *magic* of quick freezing, a brief allusion to quickness is in order.

In 1938, just as it was back in 1930, there is still a considerable discussion among freezers as to the relative importance of rapidity in freezing. FOOD INDUSTRIES has always held to the belief that irrespective of rapidity or slowness of the freezing, the net result is a frozen food. It may be of good quality and long merchantable life, or it may be of poor quality, or possess a short merchantable life.

Rapid freezing may be very important, if the food is to be frozen at all, as was pointed out by R. Brooks Taylor, (FOOD INDUSTRIES, 9, 701, December, 1937). He showed that the speed of ice formation must be faster than the rate of concentration of sugars, etc., in the center of a freezing strawberry. Or, to put it another way, the speed of freezing must exceed the speed of osmosis. Otherwise, it would be practically impossible to freeze a berry at all unless at such excessively low temperatures that it would be wholly impractical. Furthermore, such a condition of freezing could only take place by a gradually diminishing temperature. Curiously, however, if the berry were originally exposed to the lowest temperature of such a "step down" system, it would be rapidly frozen.

In the foregoing case, rapidity of freezing is very important on strictly technical grounds. Similarly, high-speed freezing is important with certain other products, also for strictly technical reasons. On the other hand, rapidity of freezing is often important for strictly economic reasons: especially where a huge volume of a perishable must be frozen with promptness before it starts to spoil. This is necessary in order to keep the size of equipment and capital invested down to reasonable figures.

To those who ask the question: "How fast is quick?" it is felt that the answer is not very important as long as the food is frozen with sufficient rapidity to insure both good quality

and low production costs. Otherwise "How fast is quick?" seems to FOOD INDUSTRIES to be only an academic question.

Until quite recently there were many who seemed to believe that freezing, if accomplished in an hour or two, was rapid freezing or quick freezing. But since the advent of the "Tennessee" method reported by R. Brooks Taylor, which freezes in about six minutes, even one-hour freezing seems to be relatively slow.

How fast is quick? We admit that we do not know.

It appears likely that the correct measurement of rapidity of freezing will be in terms of inches per hour (or per minute) of the progress of ice formation from the outside of a particle, chunk, or mass of food toward the center or highest temperature. To state the rate of freezing solely in terms of time without any reference to the distance traversed is not measuring the *rate* at all.

Again, it also seems likely that for each class of food, or for each individual food, there will some day be established upper and lower limits of temperatures that should be used for preservation by freezing. Freezing at too high temperatures may be both uneconomic and bad technology, as indicated in the case of strawberries. And freezing at too low temperatures may also be both uneconomic and bad technology.

At this point it is desirable to dwell for a moment on the reasons for excessively low temperatures—temperatures way below –15 deg. F. In general, excessively low temperatures are employed to compensate for lack of close, intimate contact between the food being frozen and the refrigerant or refrigerating surface. Where heat transfer is not easy, then the temperature-differential between refrigerant and the food being frozen must be large.

An important time-temperature relationship is to be found for nearly all foods that are preserved by freezing. This involves the so-called de-naturation of the proteins, and is commonly manifested by drip or leakage of liquid after the product is defrosted. Those who have been active in the field since 1930 can well remember the controversy between the proponents of the two opposing views: small crystals or size vs. protein denaturation or colloid dehydration. The evidence produced by Dr. H. F. Taylor (FOOD INDUSTRIES, 2, 146, 1930, and 3, 205, 1931) has not been controverted, and it appears to be fairly well established that for every food there is a definite time-temperature relationship beyond which it is impossible to go without passing beyond the point of irreversible dehydration of the colloids in that food. This theory may account for the different experiences of investigators in the field. One man will report that drip occurs after defrosting, whereas

Quick Picture of Frozen Food Industry [1]

All Frozen Foods

	1936 Output (pounds)	1936 No. companies reporting	1937 Output (pounds)	1937 No. companies reporting	1938 Intended output (pounds)	1938 No. companies reporting
Fruits and vegetables (Fruit juices included)	156,224,175	69	228,417,100	94	284,614,970	67
Fish	54,335,000	13	112,835,000	19	101,000,000	13
Poultry	24,790,000	5	27,616,000	6	34,985,000	5
Meat[5]	1,075,000	2	2,065,000	2	5,070,000	2
Total	236,424,175	89	370,933,100	121	425,669,970	87

Apparent output in 1938 [2] = 504,470,000.
= 36% increase over 1937.
Estimated output in 1938 [3] = 620,000,000.

"Quick-Frozen" Foods [4]

	1936 Output (pounds)	1936 No. companies reporting	1937 Output (pounds)	1937 No. companies reporting	1938 Intended output (pounds)	1938 No. companies reporting
Fruits and vegetables (Fruit juices included)	89,009,000	27	161,374,766	37	242,901,000	29
Fish	54,335,000	13	82,369,000	17	93,000,000	11
Poultry	24,790,000	5	27,599,000	5	34,480,000	4
Meat[5]	1,075,000	2	2,065,000	3	5,070,000	2
Total	169,209,000	47	273,407,766	62	375,451,000	46

Apparent output in 1938 [2] = 455,856,000 lb. 401,908,000 lb.
= 47% increase over 1937.
Estimated output in 1938 [3] = 480,000,000.

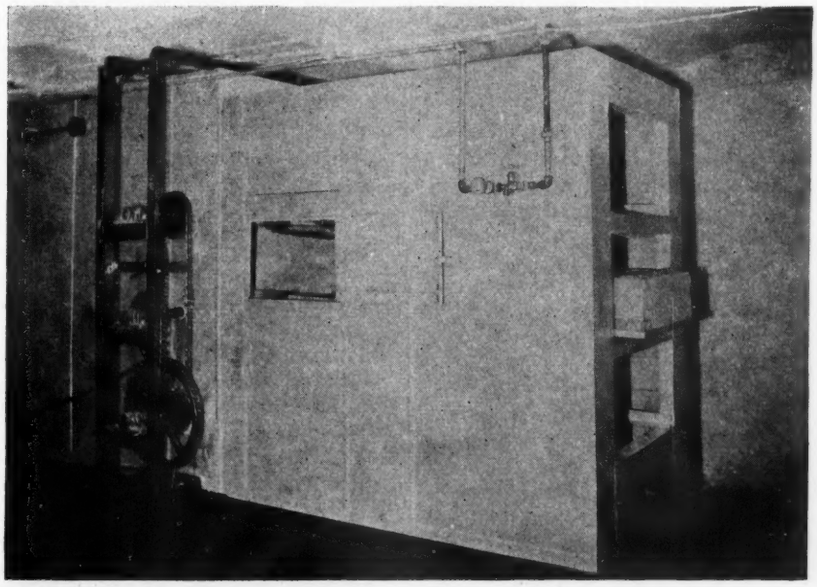
[1] Production figures given in this table for total pack of frozen foods and for "quick" frozen foods include only what has been reported to FOOD INDUSTRIES. They are not to be taken as complete for the industry, although they do include the packs of the most important companies in the freezing field. And in breaking down reported figures into the different classes of foods, it was necessary to make estimates as to the relative amounts of different types of foods in the case of three or four companies, so those amounts may be at variance to some degree with the actual packs.

[2] The figures given as the "Apparent output in 1938," for both total frozen foods and quick frozen foods was arrived at in this manner: The totals were taken for 1937 and 1938 for companies reporting packs for both years. From this a percentage increase was computed. Then this increase was applied to the total reported 1937 pack to arrive at an apparent 1938 pack.

[3] The figures given under "Estimated output in 1938" were arrived at by adding to the apparent 1938 pack estimated outputs for some of the larger companies just entering the business and by also adding the estimated production of the many small companies not reporting their packs. This estimate was arrived at by striking an average for the smaller producers on the basis of the packs of those reporting their outputs. To call this an estimate is perhaps erroneous. "Guestimate" would be better.

[4] Included in the "quick frozen" pack are the figures of companies which consider themselves producers of "quick-frozen" foods. Actually it is impossible to define what is quick frozen and what isn't.

[5] Meat frozen by packers for sale to institutional trade is not reported.



Z-process freezer (see Z Pack Corp. in table). This particular unit is used by Cudahy Packing Co. to freeze poultry at New Ulm, Minn. It freezes 400 lb. an hour. Brine spray does the freezing.

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another will deny that it does occur; and both have used the same temperature of storage but have stored their frozen foods for different times.

In the paragraphs which follow are given the names of methods of freezing which are employed. Briefly these methods can be described as follows:

Sharp Freezing

Sharp freezing or "cold storage freezing" is accomplished by placing the product in a refrigerated space at a suitable temperature. It may or may not have a moderate air movement to facilitate heat transfer, but is to be distinguished from air blast freezing where high air velocities are used. Shelf-coil freezers are usually considered as sharp freezers unless they also employ high air velocity.

Air Blast Freezing

This method is similar to sharp freezing except that very high rates of air velocity are maintained to expedite heat transfer. Though the food being frozen may or may not be in motion on a conveyor, it is customary to refer to conveyor-air blast systems as tunnel freezers. The air may be refrigerated by refrigerating coils, or by solid carbon dioxide, as in the Goebel method. In air blast freezing, the food may also be in contact with a refrigerated surface or coil, as in the Murphy freezer.

Tunnel Freezing

Tunnel freezing is really a special type of air-blast freezing in which the food being frozen is carried on a conveyor through a blast of refrigerated air. Usually the food is loose, i.e., not in packaged form. This method characterizes the York, Grayson, Carrier methods and one type of Finnegan system.

Single Contact Freezing

In some methods of freezing, such as the Cooke, the "modified compression-contact," the Kolbe floating pan, and possibly others, the food is frozen in contact with a single refrigerated metal surface. This surface is cooled by a liquid refrigerant, not by refrigerated air, though the air may aid in heat removal. The food itself may or may not be in a package or container before freezing. And it may or may not be under a moderate degree of compression in order to improve the extent of contact with the refrigerated surface.

Double Contact Freezing

This method is the famous Birds Eye system, invented by Clarence Birdseye, and now owned by General Foods Corp. In the double contact method the food is placed in a container or carton and compressed between two refrigerated surfaces. As now used these surfaces are plates, not traveling belts.

Spray or Fog Freezing

In this class of methods the heat is removed from the food by spraying the product or the package with a refrigerated liquid, as is done in the "Z" method invented by M. T. Zarotschenzeff. Z Pack quick-freezing employs refrigerant sprays at high velocity, the sprays being in direct contact with the product wherever possible. Products are preferably frozen first and packaged after freezing. Salt brine is used in the sprays for some products, such as poultry and sea foods. Sugar solutions are used for fruits and berries, and neutral solutions, made from sugars and salt, for most vegetables. Products are carried through sprays on a wire-mesh or stainless-steel conveyor.

Block Ice Freezing

The well-known "pan-freezing" method, long in use for fish freezing, and the Haslacher method employ this system. The food is placed in water and frozen either by placing the pans on brine coils or by immersing in the refrigerated brine.

Immersion Freezing

The "Tennessee" method of freezing, developed by R. Brooks Taylor (not to be confused with Harden F. Taylor, president of Atlantic Coast Fisheries) immerses the food directly in a refrigerated liquid (syrup), freezing it solid. It is then lifted out, the liquid removed by centrifuging, and the frozen food then packaged.

Unclassified Methods

The submerged tube method developed by William Finnegan (Food Industries, May, 1937, page 239), freezes a liquid (fruit juice) in cans which are pushed through the tubes. With the tubes immersed in —40 deg. refrigerant, freezing is done in about fifteen minutes.

With the Cridericed method of freezing poultry developed by John N. Crider (Food Industries, May 1937, page 246) a paper tube is inserted into the eviscerated body cavity, extending from the crop opening at the neck to the vent through which the viscera have been removed. Then the giblets and a small quantity of clean water are filled into the cavity around the tube, and refrigerated brine at —3 to —5 deg. F. is pumped through the tube.

Other Things, More Important Than Method of Freezing

By producing high quality frozen foods only can this growing industry hope for prolonged prosperity. Every lot of poor quality goods which reaches the market only serves to give a black eye to all frozen foods; for, up to the present time, consumers often fail to distinguish between brands or producers.

It cannot be reiterated too ofen that quality control is of the greatest importance. How to obtain that control is something else. Many erroneously believe that quality control is achieved solely by rapidity of freezing. This is not borne out by actual commercial experience.

One authority, who has probably spent more years in this field of work than any other man, has stated that bigger variations in quality will occur because of the initial quality of varieties of food which are frozen, differing methods of preparation, or packaging, or storage than occur because of the *method* of freezing employed. He admits that methods of freezing may make minor variations, but points out that these are far overshadowed by the lack of care or knowledge necessary to choosing raw material of proper quality and preparing, packaging and storing it properly.

Proper quality control, proper packaging, proper varieties of raw material, proper storage conditions—these all contribute mightily to a satisfactory price structure in the frozen food industry.

Appreciation

This brief introduction concludes with an expression of apreciation to the many persons who have aided Food Industries in compiling the data presented herewith. It is not possible to claim that the list of firms is absolutely complete. Nor is it possible to claim that the statistics are entirely complete. Listed data were checked by the companies concerned before being published. The Frozen Foods Directory has required over a year in which to assemble and verify the information.

Additional copies of this section may be obtained at a cost of 35 cents each. In lots of ten or more the charge will be 25 cents each.

FROZEN FOODS DIRECTORY

Company	Freezing plant location	Products	Container	System	1936 output (lb.)	1937 output (lb.)	1938 output (lb.)[1]
E. A. Aaron & Bros. Chicago, Ill.	.....	Fruits and vegetables.....	Consumer.....	.....	.....	.....	.....
[2] Alabama State Docks Cold Storage and Fruit Terminal, Mobile, Ala.	Mobile, Ala.....	Sea food (fish, shrimp); expects to freeze fruits and vegetables in future.	Various types, depending on method of packing used by consumer.	Belt type, air blast and fog (quick-freezing).	Not in operation.	500,000	Much larger than in 1937.
Algonquin Sea Foods, Ltd. St. Andrews, N. B., Canada.	St. Andrews, N. B., Canada..	Fish, clams, lobster.....	.....	Brino-Freeze (indirect brine).	.....	.....	.....
Allen Fruit Co. 295 Front St., Salem, Ore.	.....	Strawberries, raspberries, peaches, cherries, prunes, apricots, loganberries, blackberries, corn, peas.	.....	.....	.....	.....	.....
American Fish Co. Fish Pier, Boston, Mass.	Boston, Mass.....	Haddock; cod, pollock and perch fillets; H and G whiting.	Wooden boxes (15 lb.).....	Sharp freezer.....	4,000,000	2,000,000	2,000,000
Apple Growers Assn. Hood River, Ore.	Portland, Ore. (Does not operate sharp freezing plant).	Strawberries.....	Tins (30 lb.); barrels (50 gal.).	Sharp freezer.....	.....	290,000	About same as in 1937.
Armour & Co. Union Stock Yards Chicago, Ill.	Des Moines, Ia.....	Full-drawn poultry (broilers, roasters, fowl, ducklings, turkeys)	Wrapped in transparent cellulose and packed in boxes.	Quick freezing.....	.....	.....	.....
Armstrong-Gimli Fisheries, Ltd. Gimli, Manitoba, Canada.	.....	Fish.....	.....	.....	.....	.....	.....
F. M. Ball & Co. 5733 San Leandro St., Oakland, Calif.	.....	Peas.....	.....	Cooke, modified (batch plate).	.....	.....	.....
[2] Baltimore Cold Storage & Ice Co. 19 E. Pratt St., Baltimore, Md.	.....	Fruits (principally).....	30 and 50 lb. packages; barrels.	.....	.....	.....	.....
Barker Canning Co. Barker, N. Y.	Packed at Northeast, Pa.; Wilson, N. Y.; Barker, N. Y. Frozen at Buffalo, N. Y.	Cherries.....	Tins (30 lb.).....	.....	.....	.....	.....
Barker Cold Storage Co., Inc. Barker, N. Y.	.....	Cherries (cold pack).....	Barrels (450 lb.); cans (30 lb.).	Sharp freezer.....	960,000	800,000	1,400,000
Batchelder & Snyder Co., Inc. 47 Blackstone St., Boston, Mass.	Boston.....	Meats.....	.....	.....	1,400,000	2,000,000	.....
H. C. Baxter & Bro. Brunswick, Me.	Corinna, Me.....	Strawberries, blueberries, corn, peas, snap beans.	Consumer and institutional...	Birds Eye.....	Output included in that of Frosted Foods Sales Corp.		
R. D. Bodle Co. 71 Spring St., Seattle, Wash.	Seattle, Winslow, Marysville, Lynden and Grand Mound, Wash.; Banks, Lacomb, Salem and Portland, Ore.	Strawberries, red raspberries, blackberries black raspberries, loganberries, youngberries, huckleberries, gooseberries, currants, cherries, prunes, rhubarb, apricots, peaches, peas, beans, corn, spinach, broccoli, asparagus, cauliflower, squash, lima beans.	Cups (2½ and 1 lb.); cans 1, 2 and 5 gal.; 5, 10, 15, 30 lb.); barrels (50 and 30 gal.).	Birds Eye.....	22,380 cases	84,700 cases	100,000 cases
				Air blast and belt....	Output included in that of Frosted Foods Sales Corp.		
Booth Fisheries Corp. 300 W. Adams St., Chicago, Ill.	Boston, Mass.; Buffalo, N. Y.; Cleveland, Ohio; Chicago, Ill.; Seattle, Wash.	Haddock, ocean perch, sole, swordfish, halibut, green shrimp, cooked peeled shrimp, cape scallops, crab meat, lobster meat, lake perch, blue pike, yellow pike, sauger pike.	Cartons (10 and 12 oz.; 1 and 1½ lb.).	Cooke (modified).....	.....	.....	.....
Boston Bay Fillet Co. 264 Northern Ave., Boston, Mass.	Boston, Mass. (Commonwealth Ice & Cold Storage Co.).	Fish fillets, perch.....	Wooden boxes (10 lb.).....	Air blast.....	5,000,000	5,000,000	.....
Bozeman Canning Co. Mt. Vernon, Wash.	Monroe, Wash.....	Peas, cut green beans, cut corn and corn on cob, spinach, broccoli, asparagus, cauliflower.	Waxed fiber containers (2½ and 5 lb. and smaller).	Air blast.....	1,500,000	2,000,000	2,500,000
Brooklyn Bridge Freezing & Cold Storage Co., 111 Cliff St., New York, N. Y.	.....	Fish.....	.....	.....	.....	.....	.....
Brown Packing Co. Christian & Howard Sts., Philadelphia, Pa.	Operations start in Florida and move with seasons to various parts of country.	Apricots, sliced apples, blueberries, blackberries, cherries (red, sour, pitted), loganberries, peaches (yellow, white), pineapple (crushed, diced), plums, pumpkin, raspberries (red, black, seedless), rhubarb, strawberries, currants, pineapple tangerine, cranberry puree, string beans, cauliflower, peas, lima beans, waxed beans, corn, broccoli, brussels sprouts, spinach, carrots and peas, corn on cob, glazed fruits, nuts, maraschino cherries, mince meat, lemon juice, orange juice, tomato juice.	Cartons (10, 12 and 16 oz.); cans (2½, 5, 10, 15, and 30 lb.); kegs (10 and 30 gal.); barrels (50 gal.).	Air blast at subzero temperature blows on product as it rolls down incline. Products quick frozen loose then packaged.	25,000,000	30,000,000	35,000,000

FROZEN FOODS DIRECTORY

Company	Freezing plant location	Products	Container	System	1936 output (lb.)	1937 output (lb.)	1938 output (lb.)[1]
California Consumers Corp. 230 W. Jefferson Blvd., Los Angeles, Calif.	Pasadena and Los Angeles, Calif.	Poultry, fish and meats (at Los Angeles); citrus juices, berries, lima beans. (Experimental pack of several other vegetable items.)	Cans for citrus products (12, 30 and 96 oz.; vacuum sealed); boxes for berries (30 lb.), cartons for vegetables (1 to 5 lb.).	Finnegan tubes with alcohol brine at-35° F. at Pasadena; shelf freezers, with or without air blast, at Los Angeles.	Citrus juices, 1,100,000 berries, 400,000; poultry, fish, meats, 3,200,000.	Citrus juices, 3,600,000; poultry, fish, meats, 3,200,000 lb.	.....
California Fruit Growers Exchange. Ontario, Calif.	Ontario, Calif. (Packed by Exchange Orange Products Co.)	Orange juice and lemon juice	Cans (quarts, ½ gal., 1 gal. and 6 gal.).	Partially freeze juice vacuum- pack and put into sharp freezer.	Orange juice, 452,592; lemon juice, 201,177.	Orange juice, 586,098; lemon juice, 186,867.	.....
California Frosted Foods, Inc. 809 S. Center St., Stockton, Calif.	Stockton, Calif.	Peas, lima beans, string beans, asparagus, broccoli, cauliflower, brussels sprouts, artichokes, peaches, cherries, figs, mellons, apricots.	Consumer and institutional	Contemplate using air blast.	100,000	300,000	2,400,000
Canadian Frosted Foods, Ltd. Brock St., N., Whitby, Ont., Canada.	.....	Strawberries, raspberries, cherries, peas, asparagus.	.....	.....	.....	.....	.....
Canal Fish Co. Sandwich, Mass.	Sandwich, Mass.	Fish	Boxes (60 to 70 lb. and 110 to 150 lb.)	Sharp freezer	1,000,000	1,000,000	.....
Case Packing Co., Inc. Sodus, N. Y.	.....	Fruit juices, strawberries, raspberries, cherries.	.....	.....	.....	.....	.....
Clyde Kraut Co. Clyde, Ohio	Toledo, Ohio (Great Lakes Terminal Warehouse).	Sour cherries	Tins (15, 30 lb.)	Sharp freezer	80,000	360,000	200,000
[2]Commonwealth Ice & Cold Storage Co. Fish Pier, Boston.	Boston	Fish and sea foods of all varieties, fillets being the major item.	Boxes and cartons	Air blast at subzero temperature for fillets.	.....	.....	.....
[3]Consumers Ice & Coal Co. Lancaster, Pa.	Lancaster, Pa.	Fruits and vegetables, meats	Paraffined paper boxes	Direct-expansion refrigeration at – 40 deg. F.	.....	160,000	300,000
W. H. Copeland Co. Warrenton, Ore.	Warrenton, Ore.	Spinach, peas, corn, broccoli, beans, crabmeat, salmon fillet and steaks, filleted sole.	Consumer packages (12 oz.); institutional packages (2½, 5 lb.) (Boxes wrapped in waxed paper.)	Air blast and belt	None	400,000	2,000,000
Cudahy Packing Co. 221 N. La Salle St., Chicago, Ill.	Omaha, Neb.; Sioux City, Iowa Falls, Ia.; Kansas City, Mo.; St. Paul, New Ulm, Minn.; other points.	Steaks, chops, beef ribs, beef loin roasts, veal roll, beef loin steaks, veal cutlets.	Cans, boxes, cartons, etc.	Sharp freezer and Z process	.....	990,000 of poultry.	2,400,000 of poultry, shrimp.
Curtice Brothers Co. 20 Curtice St., Rochester, N. Y.	Rochester, N. Y.	Peas, corn, green beans, wax beans, carrots, peas and carrots.	Cartons (2½ and 5 lb.)	Z process	None	300,000	More than 300,000
Daggett Chocolate Co. 408 Main St., Cambridge, Mass.	Norfolk, Va. (Use Jones Cold Storage.)	Strawberries (cold pack for own use and for a few local ice cream manufacturers on contract).	Barrels	Sharp freezer	(Output included in that of Z Pack Corp.) 1,300 bbl.	2,000 bbl.	.....
Deerfield Packing Corp. Bridgeton, N. J.	Bridgeton, N. J.	Asparagus, peas, snap beans, lima beans, broccoli, cauliflower, cranberries, corn.	Consumer and institutional packages	Birds Eye	15,000,000	25,000,000	30,000,000
John H. Dulany & Son. Fruitland, Md.	Fruitland, Md.: Norfolk, Exmore, Va.	Strawberries, lima beans, stringless beans broccoli, asparagus.	Cartons (1, 2½, 5 lb.); cans (10,30 lb.); barrels.	.....	.....	.....	.....
Dyersburg Canning Co., Inc. Dyersburg, Tenn.	St. Louis, Mo.; Chicago, Ill.	Strawberries, youngberries, dewberries	Tins (30 lb.); barrels	Sharp freezer	540,000	405,000	1,350,000
Eastern Shore Canning Co., Inc. Machipongo, Va.	Machipongo, Va.	Lima beans	Tins (5 lb.)	Murphy	150,000	200,000	250,000
Eau Claire Packing Co. Eau Claire, Mich.	Eau Claire, Mich.	Black raspberries, cherries	Tins (20 lb.); barrels (400 lb.).	Sharp freezer	130,000	130,000	200,000
Elyria Canning Co. Elyria, Ohio.	Elyria and Cleveland, Ohio.	Rhubarb, strawberries, blackberries, raspberries, elderberries, gooseberries, prunes plums.	Cans (25 and 30 lb.); barrels.	Birds Eye	600,000	600,000	600,000
Emmett Ice Co. Emmett, Idaho.	Emmett, Idaho	Strawberries, cherries	Quarts, 10 lb. tins	Sharp freezer	Experimental quantities only.		
Eugene Fruit Growers Assn. Eugene, Ore.	Eugene, Ore.	Cherries, berries	Barrels; tins (30 lb.)	.....	"Do only a little freezing."		
Excelsior Creamery Co., Ltd. Santa Ana, Calif.	Santa Ana, Calif.	Pimentos, condensed skim milk	Tins (5 gal.)	Sharp freezer	Pimentos, 24,000; condensed skim milk, 70,000.	Pimentos, 34,000; condensed skim milk, 120,000.	Same as in 1937.
Fairmont Canning Co. Fairmont, Minn.	Fairmont, Minn.	Peas, lima beans, cut corn, corn on cob	Packages (½, 1, 2½, 5 and 10 lb.); paper cups.	Air blast	850,000	2,500,000	5,000,000

Fairmont Canning Co. Fairmont, Minn.	irmont, Minn.	Peas, lima beans, cut corn, corn on cob.	Packages (½, 1, 2½, 5 and 10 lb.); paper cups.	Air blast.	milk, 70,000. 850,000	milk, 120,000. 2,500,000	5,000,000

Marion T. Fannaly, Inc. Ponchatoula, La.	Ponchatoula, La.	Strawberries (principally); also, backberries, figs, youngberries, blueberries.	All sizes (from 1 lb. to barrels).	Sharp freezing and quick freezing.		2,500,000	More than in 1937 (plant with 1,000 bbl. per day capacity being built.)
Farm Bureau Fruit Products Co. Lansing, Mich.	Muskegon and Benton Harbor, Mich.	Strawberries, cherries, black raspberries, red raspberries, dewberries, grapes.	Tins (6, 15, 30 lb.); barrels.	Sharp freezer.	1,200,000	1,300,000	1,500,000
Farmers Commission House 403 W. 14th St., New York, N. Y.		Long Island ducks (ready to cook).	Wrapping of transparent cellulose.	Z process.	Output included in that of Z Pack Corp.		
M. Feigenbaum & Sons 8–9 Diamond Sq., Pittsburgh, Pa.	Washington, Oregon, California; few commodities frozen in East.	Artichoke hearts, asparagus, stringless beans, lima beans, wax beans, broccoli, brussels sprouts, cauliflower, corn on cob, cut corn, peas, peas and carrots, spinach; apricots, blackberries, boysen berries, blueberries, cherries, Columbia reds, dewberries, figs, fruit salad, grapes, huckleberries, loganberries, peaches, pineapple, prunes, raspberries, strawberries, youngberries; swordfish, halibut and salmon steaks; salmon, sole, flounder, mackerel, ocean perch, whiting, haddock, pollock and hake fillets; crabmeat, oysters, scallops, clams, shrimp, lobster, lobster tails; lemon, orange, grapefruit and pineapple juices; poultry, broilers, fryers, roasters, fowl, turkeys, ducklings.	Cartons (12 oz., 1, 2, 2½, 5 lb.); cans (15, 30 lb.); boxes (15, 30 lb.); corn on cob wrapped in transparent cellulose.	Tunnel system.	670,000	4,000,000	8,000,000
Foley & Ward, Inc. Sodus, N. Y.		Cherries.					
40-Fathom Fisheries 30 Fish Pier, Boston, Mass.	Boston, Mass.; Vinalhaven, Me.	Fish fillets of all types.	Wooden boxes (5, 10, 15 lb.).	Air blast and Kolbe.			
Fresh Frozen Foods, Inc. 210 California St., San Francisco, Calif.	Santa Clara Valley, California	Melons, artichokes, string beans, spinach, asparagus, lima beans, broccoli, brussels sprouts, apricots, peaches.	Cartons with liner and wrapper (12 oz. to 2½ lb.); paper cups.	Own.	None.	80,000	1,500,000
Fresh Frozen Products Co. Cold Storage and Fruit Terminal, Mobile, Ala.	Birmingham and Mobile, Ala.	Strawberries, blueberries and shrimp. (Expect to pack peaches, strawberries, and pineapples.)	All types (from 5 lb. to barrels).	Shelf-type quick freezer. Also specially designed quick freezer.	Did not operate.	1,000,000	
Frigid Food Products, Inc. 1951 Ferry Ave., East, Detroit, Mich.	Missouri, Ohio, Michigan, New York.	Strawberries, raspberries, blueberries, cherries, loganberries; peas, lima beans, corn, asparagus, broccoli, spinach and other vegetables; whole eggs, egg yolks, egg whites.	For vegetables, 12 oz., 2½ and 5 lb.; fruit, 1, 15, 30 lb.; eggs, 15, 30 lb.	Temperature of −25 deg. F.	Vegetables, 600,000; fruits, 2,000,000; eggs, 10,000,000	Vegetables, 1,100,000; fruits, 4,000,000; eggs, 15,000,000	
Frosted Foods Sales Corp. 250 Park Ave., New York, N. Y.	Portable freezers are moved to various parts of country with the seasons. Permanent installations at Boston, Mass.; Ft. Wayne, Indianapolis, Ind.; Omaha, Neb.; Harlingen, Texas; Hillsboro, Ore.; Halifax, N. S.; Bridgeton, N. J.; Jacksonville, Fla.; Sayville, N. Y.	Blueberries, raspberries, strawberries, youngberries, peaches, broccoli, cauliflower, green beans, wax beans, cut corn, lima beans, peas, peas and carrots, spinach, squash, asparagus, corn on cob, rhubarb, brussels sprouts; poultry: squab broilers, broilers, fryers, roasting chickens, ducklings, turkeys, fowl for fricassee; shellfish: clams, oysters, scallops, lobster meat; fish: red perch, codfish, haddock, halibut, salmon, mackerel and sole fillets; salmon and halibut steaks, swordfish, crab meat, shrimp; beef roasts, beef steaks, lamb chops, lamb roasts, lamb for stew, pork chops, pork loin roasts, sausage links, chopped steak, calves liver. (Several of the above products are packed in various styles.)	Cartons (10, 11, 12, 13, 14, 15, 16, 40 oz., 5 lb., for fruits and vegetables); transparent-cellulosed wrapped poultry in stockinets (11 oz. to 17 lb.); cartons (10 to 12 oz. for shellfish; 1 to 5 lb. for fish; 5 to 6 lb. for beef steaks; 3 to 6 lb. for beef roasts, lamb chops, lamb roasts and pork roasts, ½ lb. for calves liver. Products are wrapped in transparent cellulose put into waxed cardboard cartons, and the cartons are wrapped in waxed paper. Strawberries and peaches are put first into vegetable parchment bags.	Birds Eye plate-type freezers, with direct-expansion ammonia refrigeration. Product is packaged and placed between plates, which are brought together by hydraulic pressure. Freezing done at temperature of −35 to −45 deg. F.	Fruits and vegetables, 20,000,000; poultry, 1,000,000; fish and shellfish, 1,500,000; meats, 875,000 (Figures not official.)	36,500,000 lb. (Figure not official.)	100,000,000 lb. (Figure not official.)
Frostkraft Packing Corp. 185 Lombard St., San Francisco, Calif.	San Francisco, Calif. (Merchants Ice & Cold Storage Co.)	Apricots, spinach, artichoke hearts, broccoli, cauliflower, snap beans.					
Fruit Belt Preserving Co. East Williamson, N. Y.	East Williamson, N. Y.	Cherries, peas.	Tins (10, 15, 30 lb.) for cherries; Cartons (2½ lb.) for peas.		133,000	305,000	
Fruit Growers Co-operative. Sturgeon Bay, Wis.		R.S.P. Cherries.	Tins (16 and 30 lb.); barrels, half barrels.	Sharp freezer.	2,000,000	2,000,000	2,000,000
General Seafoods Corp. No. 1–15 Fish Pier, Boston, Mass.	Boston, Mass.	Fillets: haddock, perch, skinless (cod), sole (flounder), sole (genuine), catfish (ocean), silvering, mackerel, pollock, hake, halibut, salmon; steaks: swordfish, halibut, salmon, cod; pan dressed: perch (ocean), haddock; shellfish: scallops, clams, lobster meat crabmeat, oysters, shrimp.	Fish wrapped in transparent cellulose and put into 1, 5, 10 lb. waxed cartons; cartons are wrapped in waxed paper. Vegetables parchment wrapper used also for fish and fillets.	Birds Eye.	Output included	in that of Frosted	Foods Sales Corp.
Genoa Fisheries, Inc. 250 Northern Ave., Boston, Mass.	Boston (Commonwealth Ice & Cold Storage Co).	Fillets: haddock, cod, pollock, sole, flounder, perch, cusk, hake; pan-frozen: sardines, whiting, squid, mackerel, sand eels, butterfish, skate wings, scup, shrimp.	Boxes (10 or 15 lb., for fillets).	Quick freezing at −35 to−40 deg. F.	800,000	1,200,000	2,000,000
Glacier Bay Packing Co. South Bend, Wash.		Oysters.	Pint lithographed containers.	Sharp freezer with extremely low temperature and high air velocity.		1,500 lb. per hour capacity.	

Frozen Foods Directory

FROZEN FOODS DIRECTORY

Company	Freezing plant location	Products	Container	System	1936 output (lb.)	1937 output (lb.)	1938 output (lb)[1].
Adolf Gobel, Inc. 26 Rock St., Brooklyn, N. Y.	Brooklyn, N. Y.	Pork and lamb chops, steaks, chopped beef, beef for stew, lamb for stew, beef for roast, loin pork roast, sausage, leg of veal.	Cartons (1 lb.) meat is wrapped in transparent cellulose and inserted in window-type waxed carton before freezing.	Solid CO_2 cabinet with forced-air circulation. Temperature, −40 to −60 deg. F.; time, 1 hr.	Not in operation.	8,000 lb. per day capacity.	.....
Gorton-Pew Fisheries Co., Ltd. 327 Main St., Gloucester, Mass.	Gloucester, Mass.	Several varieties of fish	Cartons and boxes (5, 10, 15 and up to 100 lb.). Fillets wrapped in transparent cellulose. Oysters in paraffined paper cups.	Compression-contact system.	9,000,000 to 10,000,000	9,000,000 to 10,000,000	9,000,000 to 10,000,000
Gould Fruit Products. 480 Lake Ave., Rochester, N. Y.	Rochester, N. Y.	Apples, cherries, raspberries, prunes, rhubarb, strawberries, blueberries.	Cans (10, 15, 30 lb.)	Sharp freezer	300,000	400,000	400,000
Gresham Berry Growers, Inc. Gresham, Ore.	Gresham, Ore.	Strawberries, raspberries, youngberries, blackberries, loganberries, boysenberries.	Cartons (1 lb.); tins (10,15 and 30 lb.); barrels.	Air blast and coils	4,448,000	5,400,000	4,981,000
Harold E. Hamblen, Inc. 479 First Ave., New York, N. Y.	.....	Fish and sea foods — various kinds of fish fillets.	Fillets individually wrapped in transparent cellulose and packed in 5 lb. cartons; scallops in 12, 16 oz. cups; oysters in 10 oz. cups.	Z process	Output included in that of Z Pack Corp.		
Haserot Co. 521 Woodland Ave., Cleveland, O.	Bellevue, Ohio; Northport, Mich. (Freezing equipment part of cherry factories).	R.S.P. Cherries	Tins (15 and 30 lb.); barrels	Sharp freezing	240,000	160,000	300,000
A. B. Haslacher. 1 Montgomery St., San Francisco, Calif.	Salinas, Calif.	Lima beans, spinach, string beans	Cartons (sealed 1, 5 lb.)	Freeze in commercial ice plant by own system (brine freezer).	.....	.....	.....
Haxton Canning Co., Inc. Oakfield, N. Y.	.....	Peas, green and wax beans, cut corn, corn on cob.	Consumer and institutional	.....	.....	.....	.....
Hershey Packing Corp. Snohomish, Wash.	.....	Corn, peas, spinach, asparagus, snap beans, strawberries, raspberries, cherries.	.....	.....	.....	.....	.....
Hillman Packing Co. Salem, Ore.	Salem, Ore. (Terminal Ice & Cold Storage; Capital Ice & Cold Storage).	Strawberries, loganberries	Tins (30 lb.); barrels (50 gal.).	Sharp freezer (initial freezing at 8 to 18 deg. F.)	260,000	30,000	21,000
Holley Canning Co., Inc. Holley, N. Y.	Brockport and Morton, N. Y.	R.S.P. cherries and sliced apples	Tins (10, 15, 30 lb.); barrels	Sharp freezer	660,000	920,000	900,000
Honor Brand Frosted Foods Corp. 47 Harrison St., New York, N. Y.	Nebraska, New York, Delaware, Minnesota, California, Texas, Washington, Wisconsin, Indiana, Massachusetts.	Squash, peas, red raspberries, spinach, sour cherries, string beans, wax beans, rhubarb, lima beans, apples, strawberries, asparagus, peas and carrots, corn on cob, cut corn, youngberries, brussels sprouts, cauliflower, juices, figs, broccoli, artichokes, apricots, sweet cherries, peaches, loganberries, melons, pineapple, plums, poultry, fish.	Cartons (½, 1, 2½, 5, 10, 15 and 30 lb.).	Combination of various methods (direct contact, belt, tunnel, etc.). Loose pack is distinguishing feature. Low temperatures and short time used.	2,100,000	8,350,000	20,000,000
Earl T. Howell. Ketcham Ave., Newfane, N. Y.	.....	Raspberries, cherries, red currants, grape pulp, fruit juices.	.....	.....	.....	.....	.....
Hudson River Fruit Exchange, Inc. Milton, N. Y.	Milton, N. Y.	Red currants, raspberries, cherries, grape pulp, fruit juices.	Barrels	Sharp freezer	3,000,000	4,000,000	.....
Hunt Brothers Packing Co. 145 Division St., Salem, Ore.	Salem and Puyallup, Wash.; San Francisco, Calif.	Peas, strawberries, raspberries, loganberries, cherries, blackberries, corn, peaches, prunes, youngberries.	.....	.....	.....	.....	.....
Humboldt Canning Co. Humboldt, Tenn.	St. Louis and Louisville	Strawberries	Tins, barrels, cartons	.....	Did not pack	400,000	900,000
H. W. Jacobs Co. Pleasant Grove, Utah.	Provo, Utah	Strawberries, cherries, raspberries	Cans (10, 30 lb.); barrels (50 gal.).	Sharp freezer	245,000	500,000	500,000
C. S. Kale Canning Co. Everson, Wash.	.....	Raspberries, strawberries, pitted cherries	Tins (25 lb.); barrels	Sharp freezer	.....	200,000	.....
Kelley, Farquhar & Co. Tacoma, Wash.	Salem and Banks, Ore.; Tacoma, Wash.	Vegetables and fruits	Tins (25 lb.); barrels; industrial and consumer packages.	Air blast, belt	.....	.....	.....
Kingan & Co. Indianapolis, Ind.	Indianapolis	Meats	.....	Birds Eye	Output included in that of Frosted Foods Sales Corp.		
Irwin H. Kolbe Co. Erie, Pa.	.....	Fish	.....	Kolbe (indirect brine).	.....	.....	.....
W. F. Kolbe & Co., Ltd. Port Dover, Ont., Canada.	.....	Fish	.....	Kolbe (floating pan; diving bell).	1,000,000	1,000,000	1,000,000
Kruse's, Inc. 2253 Germantown Ave., Philadelphia, Pa.	Philadelphia, Pa.; Norfolk, Va.; Plant City, Fla. (Portable freezers used).	Strawberries, peaches, red raspberries, black raspberries, pureed raspberries, blackberries.	Cartons (10 lb.); cans (30 lb.); barrels, kegs.	Sharp freezer for large containers; quick freezing by air blast for small packages.	4,000,000	7,500,000	6,000,000 to 7,000,000
Kuhner Packing Co. Muncie, Ind.	Muncie, Ind	Meats	Regular meat packages	Frick freezing equipment.	.....	.....	.....
Libby-Burshell Fisheries. Vinalhaven, Me.	.....	Fish	.....	Kolbe (floating pan).	.....	.....	.....
Lockeport Co., Ltd. Lockeport, N. S., Canada.	.....	Fish	.....	Metal envelope (indirect brine).	.....	.....	.....
Long Island Duck Packing Corp.	Freezing at Riverhead, N. Y.;	Cauliflower, lima beans, oysters, scallops,	Boxes, transparent-cellulose	Z process and own	3,700,000	5,800,000	8,500,000

Muncie, Ind. Libby-Burshell Fisheries Vinalhaven, Me.		Fish		Kolbe (floating pan)			
Lockeport Co., Ltd. Lockeport, N. S., Canada.		Fish		Metal envelope (indirect brine).			
Long Island Duck Packing Corp Riverhead, N. Y.	Freezing at Riverhead, N. Y.; eviscerating plant at Eastport, N. Y.	Cauliflower, lima beans, oysters, scallops, ducks.	Boxes, transparent-cellulose bags, vegetable parchment box liner (consumer and institutional sizes).	Z process and own system of quick freezing (brine film).	3,700,000	5,800,000	8,500,000
Lord-Mott Co Baltimore, Md.	Baltimore, Md	Rhubarb, spinach, strawberries	Cartons (1 lb.); barrels (450 lb., for strawberries).	Sharp freezing	Not large	Not large	
R. I. MacLaughlin & Co Payallup, Wash.	Salem and Albany, Ore.	Strawberries, raspberries, cherries, loganberries, youngberries, black raspberries, gooseberries, rhubarb, blackberries.					
B. E. Maling, Inc Hillsboro, Ore.	Hillsboro, Ore.	Apricots, peaches, prunes, rhubarb, strawberries, crabmeat, asparagus, broccoli, brussels sprouts, cauliflower, corn, squash, peas, green beans, wax beans, lima beans, peas and carrots, spinach, salmon.	Consumer and institutional packages; barrels.	Birds Eye	Output included in that of Frosted Foods Sales Corp.		
Ralph M. Meiler Gasport, N. Y.	Buffalo, N. Y.	Strawberries; columbian, red and black raspberries; cherries; grape pulp; and crab apple cider.	Tins (30 and 50 lb.); barrels	Sharp freezing	1,240,000	1,560,000	2,000,000
[2]Midwest Cold Storage & Ice Corp 5th St. and Kaw River, Kansas City, Kan.		Eggs (frozen for Standard Brands, Inc.), strawberries, raspberries, grape pulp, apples, etc.		Sharp freezing			
Minnesota Valley Canning Co Le Sueur, Minn.		Packing frozen foods on experimental scale.					
S. A. Moffett Co 1331 Western Ave., Seattle, Wash.	Seattle and Everett, Wash.; Salem, Ore.	All varieties of fruits, peas, corn on cob, cut corn, spinach, broccoli, cauliflower, string beans, lima beans, asparagus.	Cartons (12 oz., 1, 5, 10 lb.); tins (10, 15, 30, 50 lb.); barrels (30, 50 gal.).	Air blast and sharp freezer.	3,524,000	5,024,000	7,000,000
Morrison Fish Co. of New York, Inc. 1010 Walabout Market, Brooklyn, N. Y.		Lobster	Paper cups				
Morton Canning Co., Inc Morton, N. Y.	Morton and Brockport, N. Y.	Cherries	Tins (15 and 30 lb.); barrels (450 lb.).	Air blast, at −20 deg. F.	900,000	1,000,000	
B. D. Mukai & Son Vashon, Wash.	Vashon, Wash	Strawberries, loganberries, raspberries, red sour cherries, currants.	Cups (10 lb.); cans (30 lb.); barrels (30 and 50 gal.).	Sharp freezer for 48 hours, thereafter held at temperature of 15 to 18 deg. F.	700,000	830,000	1,000,000
C. H. Musselman Co Biglerville, Pa.		Cherries and other fruits in season		Frick refrigerating equipment.			
Mutual Citrus Products Co., Inc Anaheim, Calif.		Orange and lemon juice (packed only on special order).	Cans (6 gal.)				
M. Nakata Foods Products, Inc 208 Columbia St., Seattle, Wash.		Corn, peas, spinach					
National Fish Co., Ltd Halifax, N. S., Canada.	Halifax, N. S.	Haddock, codfish, hake, pollock, soles, herring, mackerel, salmon, swordfish, smelts, flounders, skatewings, cod tongues, cod roes, scallops, smoked fillets, kippered herring, smoked finnan haddies, fillets of haddock and codfish. (All kinds of sea fish produced in local waters.)	All kinds (from waxed parchment and transparent cellulose to cardboard containers, cartons, wooden boxes, etc., of various sizes and shapes).	Own method	7,000,000		
National Fruit Canning Co 1720 W. Spokane St., Seattle, Wash.	Chehalis, Wash	Strawberries, rasberries, cherries, blackberries, loganberries, currants, peas.					
Chas. Neubert Strawberry Co., Inc 114 E. York St., Baltimore, Md.	Baltimore, Md.	Strawberries, peaches, blackberries	Tins (30 lb.); barrels (450 lb.).		1,350,000	1,350,000	
New England Fillet Co., Inc 26 Fish Pier, Boston, Mass.	Boston, Mass. (Commonwealth Ice & Cold Storage Co.)	Fillets: perch, haddock, pollock, hake, whiting, mackerel; scallops (in 1-gal. paper containers).	Wooden and paper containers (5, 10, 15 lb.); cans (30 lb.).	Air blast	4,407,000	5,500,075	6,500,000
A. E. Nickerson, Ltd Yarmouth, N. S., Canada.		Lobster		Indirect brine; cans used.			
L. F. Noonan Co., Inc 2514 Adeline St., Oakland, Calif.	San Jose and Santa Clara,	Peas, asparagus, squash, string beans, lima beans, broccoli, cauliflower (will add apricots, peaches, and perhaps berries).	Cartons (1, 2½, 5 lb.; wrapped and lined with transparent cellulose); tins and paper cans (2½, 5 lb.); boxes (40 lb.).	Cabinet freezer with ammonia coils temperature of −50 deg. F.		2,000,000	
O'Donnell-Usen Fisheries Fish Pier, Boston, Mass.	Boston, Mass	Haddock, cod, pollock, sole, sea perch, hake, finnan haddies, smoked fillets, scallops	All types—industrial, consumer, tins (25 lb.); barrels.	Air blast		18,000,000	24,000,000
F. J. O'Hara & Sons, Inc 21 Fish Pier, Boston, Mass.	Boston, Mass. (Commonwealth Ice & Cold Storage).	All varieties of fish, such as haddock, cod, pollock, redfish, mackerel, etc.	Containers range from 10-lb. fillet boxes to 150-lb. boxes.	Air blast	450,445	419,463	
O'Hara Bros. Company, Inc 22 Fish Pier, Boston, Mass.	South Boston, Mass	Fillets of haddock, pollock, cod, hake, cusk, redfish, sole, flounder, and mackerel.	Wooden boxes (10 and 15 lb.).	Frick equipment for quick-freezing; temp. as low as −40 deg. F.		Fillets, 25,000,000; mackerel and whiting, 5,000,000.	Fillets, 25,000,000; mackerel and whiting, 5,000,000.
O'Loane Kiely & Co., Ltd 1058 Hamilton St., Vancouver, B. C., Canada.		Strawberries, raspberries, loganberries, blackberries, black and red currants, gooseberries (cold pack); peas, beans, spinach, corn (frozen).	Paper cups (1 lb.); tins (15 and 30 lb.); barrels.	Shelf freezers (direct-expansion coils, still air).			

Frozen Foods Directory

FROZEN FOODS DIRECTORY

Company	Freezing plant location	Products	Container	System	1936 output (lb.)	1937 output (lb.)	1938 output (lb.)[1]
Olney & Carpenter, Inc. Wolcott, New York.	Wolcott, N. Y. Eden, N. Y.	Peas, asparagus, spinach, rhubarb, wax beans, green beans, lima beans, broccoli, cut corn, corn on cob, cherries, sliced strawberries, raspberries, cauliflower, brussels sprouts, squash.	Paraffined cardboard, cylindrical container with slip cover.	Contact and air blast.	.....	.....	.....
Olympia Canning Co. Columbia & A Sts., Olympia, Wash.	.....	Strawberries, raspberries, loganberries, blackberries.	.....	.....	.....	.....	.....
Orleans County Canning Co. Albion, N. Y.	.....	Cherries.	.....	.....	.....	.....	.....
Ozark Cold Packing Corp. 215 Dickson St., St. Louis, Mo.	.....	Strawberries.	.....	.....	.....	.....	.....
Packaged Foods, Inc. Box 276, Raleigh, N. C. (Sales organization for Hamlet Ice. Co.)	Hamlet, N. C.	Strawberries, peaches, peas, lima beans, asparagus, raspberries, broccoli, spinach.	Tins (10 and 30 lb.); industrial and consumer packages.	Air blast.	Small production.	Medium production.	.....
Paulus Bros. Packing Co. Trade & High Sts., Salem, Ore.	.....	Berries, strawberries, loganberries, red cherries.	Barrels (50 gal.).	Sharp freezer.	.....	.....	.....
Frank E. Pilley & Sons, Inc. Sioux City, Iowa.	.....	Poultry (full drawn); corn on cob	Boxes and transparent-cellulose wrapping.	Z process.		740,000	800,000
					Output included in that of Z Pack Corp.		
Pleasant Grove Canning Co. Pleasant Grove, Utah.	Provo, Utah.	Fruits and berries.	Tins (10, 20, 30 lb.); barrels.	Sharp freezer.	200,000	600,000	350,000
Pratts Fresh Frozen Foods, Inc. 513 W. 16th St., New York, N. Y.	Plants at various points throughout United States.	Asparagus, broccoli, cauliflower, corn, lima beans, string beans, wax beans, peas, spinach, apples, apricots, cranberries, cherries, blackberries, loganberries, pineapple, peaches, plums, raspberries, rhubarb, strawberries, youngberries; orange, lemon, pineapple, grapefruit juices.	Cartons, waxed; lithographed tins (1 to 30 lb.). Full line of retail-size packages.	Air blast Murphy freezers and own process.	.....	.....	.....
Grant L. Pugh. Lockport St., Hawley, N. Y.	.....	Cherries.	.....	.....	.....	.....	.....
Ray-Maling Company, Inc. Hillsboro, Ore.	Woodburn, Ore.	Strawberries, youngberries, raspberries, green beans.	Consumer and institutional packages; barrels.	Birds Eye.	Output included in that of Frosted Foods Sales Corp.		
Red Wing Co., Inc. Fredonia, N. Y.	.....	Strawberries, raspberries, cherries.	.....	.....	.....	.....	.....
Reid, Murdoch & Co. Front & Market Sts., Salem, Ore.	.....	Strawberries, raspberries, cherries, loganberries, youngberries. (Packed mostly for own use.)	Barrels (50 gal.); tins (30 lb.)	Sharp freezer	.....	.....	.....
Reynolds Preserving Co. Sturgeon Bay, Wis.	.....	Pitted red cherries.	Cans (slip-cover, enamel-lined, 10, 15, 30 lb.); barrels (paraffin-lined, 30, 50 gal.); some 5 gal. tins (enamel-lined, plug top).	Sharp freezer	None.	270,000	.....
Rochester Ice & Cold Storage Utilities, Inc. 55 Canterbury Rd., Rochester, N. Y.	Rochester, N. Y.	Sliced apples, corn on cob, sour cherries, strawberries, spinach, peas, whole and cut wax beans, cut corn, diced carrots; may freeze asparagus, raspberries and lima beans.	Consumer and institutional; cans (20, 30 lb.); barrels.	Z process.		600,000	
					Output included in that of Z Pack Corp.		
Rood & McLean Fruit Products. Franklin St., Westfield, N. Y.	Westfield, N. Y.; Erie, Pa.	Cherries, raspberries, strawberries, currants, grape pulp.	Barrels.	Sharp freezer.	225,000 to 450,000	225,000 to 450,000	225,000 to 450,000
Edward L. Saisselin. O. & W. Bldg., Oswego, N. Y.	.....	Spinach, broccoli.	Cartons (14 oz.; 2½ to 5 lb.); also waxed cartons above 5 lb.	Air blast tunnel system, subzero temperature.	Small.	50,000	250,000
E. E. Saunders & Co. Pensacola, Fla.	.....	Red snapper, grouper, pompano, spanish mackerel, blue fish, mullet, scallops, shrimp.	10 lb. packages for shrimp and fillets.	Cabinet freezer(Vilter Mfg. Co.).	.....	20,000 lb. per day capacity.	.....
A. F. Scharping. Albion, N. Y.	.....	Strawberries, cherries.	.....	.....	.....	.....	.....
Seven Seas Fisheries, Ltd. Liverpool, N. S., Canada.	.....	Fish.	.....	Kolbe (floating pan).	.....	.....	.....
E. A. Smith & Co. Baltimore, Md.	Baltimore Md.	Strawberries, black and red raspberries, blackberries, pineapples and peaches.	Cans (10, 15, 30 lb.); barrels.	Sharp freezer.	750,000	1,000,000	2,000,000
Snider Packing Corp. Temple Bldg., Rochester, N. Y.	.....	Vegetable, fruits.	.....	Birds Eye.	Output included in that of Frosted Foods Sales Corp.		
Sodus Canning Co. Box J, Sodus, N. Y.	Sodus, N. Y. (Sodus Cold Storage Co.)	Strawberries, red sour cherries.	Tins (15, 30 lb.); barrels.	Air blast.	120,000	226,000	250,000 to 300,000
Sodus Fruit Farm, Inc. Sodus, N. Y.	Sodus, N. Y.	Cherries.	Cans; barrels.	.....	400,000	1,200,000	.....
South Haven Fruit Exchange. P. O. Box 168, South Haven, Mich.	South Haven, Mich.	Strawberries, raspberries, plums.	Barrels.	York ammonia refrigeration.	None.	540,000	450,000
Southern Packing Co., Inc. Baltimore, Md.	Baltimore, Md.; Waynesboro, Pa.	Strawberries, red raspberries, black raspberries, peaches, pineapple, lima beans, stringless beans, peas.	Tins (30, 50 lb.); barrels (30, 50 gal.).	Quick freezing.	.....	.....	.....
Springbrook Packing Co. Cooperative. Springbrook, Ore.	Springbrook, Ore.	Strawberries, loganberries, red raspberries,	Boxes (20, 30 lb. dry pack);	Air blast.	251,370	240,800	240,800

Southern Packing Co., Inc. ..... Baltimore, Md.	Baltimore, Md.; Waynesboro, Pa.	Strawberries, red raspberries, black raspberries, peaches, pineapple, lima beans, stringless beans, peas.	Tins (30, 50 lb.); barrels (30, 50 gal.).	Quick freezing.....	.....	.....	.....
Springbrook Packing Co. Cooperative.. Springbrook, Ore.	Springbrook, Ore.....	Strawberries, loganberries, red raspberries, youngberries, boysenberries, red sour cherries.	Boxes (20, 30 lb. dry pack); barrels; tins (10, 30 lb.).	Air blast.....	251,370	240,800	240,800
Stayton Canning Co. Coop..... Stayton, Ore.	Salem, Ore. (Terminal Ice & Cold Storage Co.)	Strawberries.....	Barrels (50 gal).....	Sharp freezer.....	550,000	500,000	.....
Stokely Bros. & Co..... Indianapolis, Ind.	(Indiana, Indianapolis), Wisconsin, Deleware, Texas (Mercedes), California, Washington	Extensive line of fruits and vegetables	Consumer and institutional	Quick freezing	.....	.....	.....
Sunshine Packing Corp..... 2715 East 34 St., Cleveland. O.	Cleveland, Ohio; North East, Pa.; Ponchatoula and Albany, La.	Strawberries, cherries, red raspberries, blackraspberries, blackberries, red currants, black currants, crushed pineapple, peaches, apricots, elderberries, gooseberries, blueberries, Columbian raspberries, grapes, prunes, plums.	Cans (15, 30 lb.); barrels (450 lb.).	Sharp freezer.....	10,000,000 to 12,000,000	11,000,000 to 13,000,000	9,000,000
Swift & Co..... Union Stock Yards Chicago, Ill.	Chicago, Ill.....	Poultry (full-drawn).....	Birds wrapped in transparent cellulose.	Quick freezer.....	.....	.....	.....
R. C. Teachey & Co., Inc..... Wallace, N. C.	Norfolk, Va.....	Strawberries, blackberries.....	Tins (30 lb.); barrels (30, 50 gal.).	.....	1,500,000	2,500,000	.....
[2] Terminal Ice & Cold Storage Co. .... Salem, Ore.	Salem, Ore.....	Berries, fruits, vegetables.....	Sizes from 1 lb. up.....	Air blast chamber with wire mesh belt; temperature −15 deg. F. Berries frozen in 15 min.	.....	2,600,000	.....
Texas Sea Foods, Inc..... National Standard Bldg., Houston, Texas. (Name expected to be changed to Freezerved Foods, Inc.)	Freezing facilities will be in Rio Grande Valley and along coast of Texas, supplemented by smaller operations or use of portable freezers at other points near source of supply.	Complete line of fruits, vegetables, sea foods, meat, poultry and such other commodities as are found in territory of the company.	Institutional packages — also consumer, when production warrants.	Grayson continuous tunnel system — air blast at temperature of −45 deg.F. (No blanching used with this system.)	Not in production.	Not in production.	Will be in production this spring. Several plants to be built.
G. N. Turner Canning Co..... Maple St., Snohomish, Wash.	Snohomish, Wash.....	Berries, corn, spinach, peas.....	Fiber (wax-wrapped ½ to 5 lb.).	Belt.....	300,000	600,000	1,200,000
Vicana Foods, Inc..... Obrapia, 19, Havana, Cuba.	Havana, Cuba.....	Pineapple (standard circular slices; some crushed) (will be on American Market in May.)	1, 10 lb. containers.....	Z process.....	Not in operation.	Not in operation.	200,000
Wall Street Packing Co..... P. O. Box 254, Watsonville, Calif.	Watsonville, Calif.....	Strawberries, loganberries, youngberries, boysenberries, blackberries, raspberries, cherries, apricots, plums, peaches, spinach, broccoli, cauliflower, string beans, rhubarb, shelled peas, lima beans.	Industrial, institutional and consumer packages; barrels; tins (25 lb.).	Sharp freezer (may install new system).	.....	1,000,000	.....
Ward & LeRoy, Inc..... Box 4, Sodus, N. Y.	Sodus, N. Y. (Sodus Cold Storage Co.)	Sour cherries.....	Cartons (1, 10, 30 lb.).....	Sharp freezer.....	200,000	1,000,000	1,000,000
Washington Canners Cooperative..... 507½ Main St., Vancouver, Wash.	Vancouver, Wash.	Asparagus, strawberries, raspberries, cherries.	Boxes, cups, cartons	Sharp and quick freezing	1,312,500	1,500,000	.....
Washington Frosted Foods, Inc..... 71 Spring St., Seattle, Wash.	Kent, Wash.....	Peas, corn, string beans, carrots and peas, cauliflower, asparagus, broccoli, spinach.	Industrial and consumer.....	Air blast and belt...	1,660,000	3,000,000 to 3,200,000	5,000,000
Washington Packers, Inc..... Sumner, Wash.	Sumner, Puyallup, Wash.....	Raspberries, blackberries, huckleberries, sliced peaches, gooseberries, strawberries, currants, cherries, loganberries, youngberries, etc; asparagus, peas, beans, corn, broccoli, spinach, peas and carrots, lima beans.	Cartons (1, 2½, 5 lb.); boxes (25 lb.); tins (10, 15, 30 lb.); barrels (50 gal.).	Metal belt for quick-freezing; cold storage room for barreled products.	8,386,000	9,750,000	.....
Waterman & Sons, Inc..... Ontario Center, N. Y.	Ontario Center, N. Y. (Ontario Cold Storage Co., Ontario, N. Y.)	Cherries.....	Tins (10, 15, 30 lb.); barrels (450 lb.).	Air blast.....	300,000	400,000	400,000
Webster Canning & Preserving Co .... Webster, N. Y.	Ontario, N. Y. (Ontario Cold Storage Co.)	Cherries.....	Tins (15, 30 lb.).....	Sharp freezer.....	20,000	None.....	.....
Wells, Ferris & Wade..... Jacksonville, Fla.	.....	Fish, shrimp.....	.....	Frick refrigerating system.	.....	.....	.....
Westfield Planters Cooperative Fruit Products, Inc. Westfield, N. Y.	.....	Strawberries, raspberries, cherries.....	.....	.....	.....	.....	.....
Whidby Island Berry Growers Assn.... Langley, Wash.	Langley, Wash.....	Strawberries.....	Barrels (50 gal.).....	Sharp freezer.....	280,000	200,000	.....
Willamette Valley Prune Assn. ..... Trade & High Sts., Salem, Ore.	Salem, Ore.....	Strawberries, blackberries, pitted prunes....	Tins (30 lb.); barrels.....	Sharp freezer.....	10 cars	10 cars	.....
D. H. Wright & Co..... 130 E. Main St., Rochester, N. Y.	Seattle, Wash.....	Strawberries, red raspberries, loganberries, prunes, peaches, apricots, currants, huckleberries, peas, corn, corn on cob, spinach, green beans, broccoli, carrots, asparagus, etc.	Carton (1, 2½, 5 lb., for vegetables); tins (15 and 30 lb.); tubs (1 lb., for fruits); barrels; half barrels.	Sharp freezer. (Products quick frozen).	Vegetables, 200,000; fruit, 1,000,000.	Vegetables, 1,000,000; fruit, 2,000,000.	Vegetables, 2,000,000; fruit, 3,000,000.
Z Pack Corp..... 420 Lexington Ave., New York, N. Y. (Licenses use of Z process; does not pack.)	Riverhead, N. Y.; Rochester, N. Y.; Havana, Cuba; New York, N. Y.; Des Moines, Ia.; New Ulm, Minn.; Sioux City, Ia.; Iowa Falls, Ia.; Cuero, Texas.	Ducks (at Riverhead); fruits and vegetables (at Rochester); fruits (at Havana); fish and sea food (at New York); poultry (at Des Moines, New Ulm, Sioux City, and Iowa Falls); sea food and other products (at Cuero).	.....	Z process quick-freezing, liquid refrigerant sprays applied to products on traveling conveyor; uses sugars, neutral solutions, or salt solutions, according to product.	2,156,000 of Ducks, Long Island Duck Packing Corp., Riverhead, N. Y.)	5,074,000 (Fruits, vegetables, poultry, fish.).	Anticipate 200 to 300 per cent increase (10,148,000 to 15,222,000 lb.)

[1] Intended pack.
[2] Freezes for packers but does not pack for freezing

SUPPLEMENT TO FROZEN FOODS DIRECTORY

(Information received too late to be included in main body of Directory)

Company	Freezing plant location	Products	Container	System	1936 output (lb.)	1937 output (lb.)	1938 output (lb.)[1]
Albert Frank-Guenther Law, Inc., Packard Bldg., Philadelphia, Pa.	Harlingen, Texas; Bridgeton, N. J.; Albion, Mt. Morris, Medina, N. Y.; Hillsboro, Ore., Ft. Wayne, Ind.	Fruits, vegetables, poultry, fish, meat	.....	.....	8,000,000 lb. of peas (estimated).	.....	.....
Atlantic Coast Fisheries Co. 111 John St., New York, N. Y.	Provincetown, Mass.; New York, N. Y.	Frozen fish and sea food, all varieties — principally cod, haddock, red perch, and whiting fillets; dressed whiting, shrimp, scallops and many other varieties of round frozen fish.	For frozen fillets, parchment wrappers in 15 lb. shook boxes or 15 lb. corrugated cartons; also transparent-cellulose wrapped cartons. For shrimp, 5, 10 lb. sulphite cartons.	Regular sharp freezer and Cooke process.	7,500,000	7,500,000	9,000,000
Atlantic Quick Freeze Co. New Bedford, Mass.	.....	Fish fillets and sea food	Cartons (¼, 1, 5 lb.); transparent cellulose wrapping.	Z process	Output included in that of Z Pack Corp.		
Joseph Buchwald & Co. 855 McAllister St., San Francisco, Calif.	.....	Berries, cherries; eggs	.....	.....	.....	.....	.....
Cherry Growers Packing Co. Traverse City, Mich.	Traverse City, Mich.	Cherries, apples	For cherries, 30 lb., containers and barrels; for apples, 30 lb. tins.	Direct-expansion ammonia freezer, with small fans.	4,500,000 to 5,000,000 of cherries; 1,500,000 of apples.	About same as in 1936.	About same as in 1936
F. & M. Packing Co. Traverse City, Mich.	Traverse City, Mich.	Cherries	Tins (30 lb.); barrels	Sharp freezer	750,000	840,000	1,250,000
A. N. Faulkner & Co. Tilgham, Md.	.....	Strawberries	Cans (30 lb.); barrels (50 gal.).	.....	33,000	83,000	As much or more than in 1938.
Florence Fish and Oyster Co. 206 N. Irby St., Florence, S. C.	Florence, S. C.	Mullet, croakers, porgies, salmon trout, pan trout, shrimp, flounders.	Boxes (100 lb. or smaller).	Sharp freezer at 5 deg. F.; also York equipment for quick freezing at —10 deg. F.	600,000	800,000	1,000,000
Fresh Frozen Fruits, Inc. 516 Seaton St., Los Angeles, Calif.	.....	Youngberries (contemplate freezing other berries and vegetables).	.....	.....	.....	.....	.....
Frost Sealed Products, Inc. Sumner, Wash.	Sumner, Wash.	Peas, corn on cob, cut corn	Waxed cartons (12 oz., 1, 2½, 5 lb.).	Air blast on a belt	None	600,000	1,200,500
H. S. Gile & Co. Salem, Ore.	Roseburg and Newberg, Ore.	Principally berries, such as strawberries, loganberries, blackberries; fresh prunes.	Tins (30 lb.); barrels	Sharp freezer	.....	450,000	More than in 1937.
Hartmann Dried Fruit Co., Inc. Macedon, N. Y.	Rochester, N. Y.	Black, Columbian and cuthbert raspberries.	Tins (15, 30 lb.); barrels.	.....	.....	.....	.....
Havana Canning Co. Havana, Fla.	Jacksonville, Fla.	Principally blackberries and blueberries; plan to freeze pears, strawberries and small quantity of vegetables (string beans and lima beans, principally).	Barrels; expect to use 12 oz. and 10 lb. consumer and institutional packages for blackberries, blueberries and strawberries; also 30 lb. wooden baskets.	Sharp freezer	155,000 of wild blackberries.	33,089 of wild blackberries; 19,266 of blueberries.	460,000 of blackberries; 150,000 of blueberries.
Henderson Brothers, Inc. Monticello, Ga.	.....	Fruits, vegetables, chickens, squabs	.....	.....	.....	.....	.....
F. H. Hogue of Washington Frosted Foods Division, Inc. Kent, Wash.	Kent, Wash.	Asparagus, peas, corn, spinach, broccoli, beans, berries, fruit.	All types; specialize in flat type; also cups and tubs.	Peas and corn individually frozen.	.....	.....	.....
Jerpe Commission Co., Inc. Omaha, Neb.	Seward, Neb.; preparing freezer at Omaha, Neb.	Poultry products of all kinds	Consumer and institutional.	Birds Eye	500,000	More than 1,000,000. Output included in that of Frosted Foods Sales Corp.	4,000,000
Kelley, Farquhar & Co. Port of Tacoma, Tacoma, Wash.	Tacoma, Wash.; Salem, Ore.	Rhubarb, gooseberries, strawberries, cuthbert red raspberries, mixed red raspberries, black raspberries, youngberries, blackberries, apricots, peaches, Italian plums, pitted sour cherries, sweet cherries, huckleberries, asparagus, green beans, corn, peas and carrots, peas, wax beans, spinach, broccoli, cauliflower, brussels sprouts.	For vegetables, 12 oz., 2½, 5, 10 lb., packages; for fruits and berries, 1, 5, 10, 30 lb. and 30 and 50 gal. containers.	Tunnel system for freezing vegetables.	None	2,000,000	3,000,000
A. & R. Loggie Co., Ltd. Loggieville, N. B., Canada.	Have nine cold storage plants scattered over Maritime Provinces, in New Brunswick and Nova Scotia.	Frozen fish of every variety; blueberries.	.....	Sharp freezers	Several hundred thousand pounds.		
William E. McIntosh	Geneva and Newfane, N. Y.;	Apples, peaches, berries, cherries and	Cups (1 lb.); packages	Sharp freezing (at	3,000,000	4,000,000	5,400,000

William E. McIntosh Geneva, N. Y.	Geneva and Newfane, N. Y.; Northeast, Pa.	Apples, peaches, berries, cherries and vegetables.	Cups (1 lb.); packages (2½ lb.); tins (30 lb.); barrels (50 gal.).	Sharp freezing (at zero degrees).	3,000,000	4,000,000	5,400,000
Manitoba Cold Storage Co., Ltd. Higgins Ave. and Meade and Argyle Sts., Winnipeg, Man., Canada.	Winnipeg, Man., Canada	Fish and other commodities		Series of large cabinets with shelf coils.	Large volume (200,000 lb. per day capacity).		
[1] Merchants Ice & Cold Storage Co. Sansome, Lombard, Battery, Greenwich & Montgomery Sts., San Francisco, Calif.		Sea foods, poultry, meats, barreled berries, boxed and tray berries, fruits and vegetables.	Consumer and institutional.	Enclosed shelf freezers which operate at extremely low temperatures.			
Miller Canning Co Mount Vernon, Wash.	Seattle, Wash.	Peas	Cartons (waxed)	Loose and/or in cartons.	None	280,000	1,500,000
New England Fish Co Vancouver, B. C., Canada	Kalama, Wash.; Eureka, Calif.; Boston, Mass.; New York, N. Y.; Chicago, Ill.; Ketchikan, Petersburg, Sitka, Juneau, Alaska; Vancouver, Butedale, Prince Rupert, B. C.	Salmon, halibut and other Pacific Coast fish (dressed, and packaged slices and fillets).	Wooden boxes for whole dressed fish; cartons for slices and fillets.	Sharp freezing, very low temperature (–30 to –50 deg.).	15,000,000	15,000,000	15,000,000
Niagara Frosted Foods, Ltd. Hamilton, Ont., Canada.	Stoney Creek, Forthill, Kingston, Ont.	Fruits and vegetables					
Norfolk Berry Growers' Association Simcoe, Ont., Canada.	Simcoe, Ont., Canada	Strawberries, raspberries	Pails (23 lb.); barrels (50 gal.).	Direct-expansion ammonia coils.	236,222 of strawberries; 70,762 of raspberries.	251,794 of strawberries; 106,436 of raspberries.	
Omaha Cold Storage Co Omaha, Neb.	Omaha, Neb	Poultry (fully dressed) and eggs	Barrels, standard poultry packages, consumer packages; eggs in 15 and 30 lb. cans.	For poultry, sharp freezer (–15 deg.); air blast for egg pulp.	20,000,000 of poultry; 5,000,000 of eggs.	About same as in 1936.	About same as in 1936'
Oregon Fruit Products Co 909 First St., Salem, Ore.	Salem, Ore	Berries, fruits, vegetables	10, 15, 30 lb. containers and barrels.	Dry pack, individually frozen and regular pack.	97,675	274,708	541,970
Pickering Pea Packing Co Montesano, Wash.		Blackberries (evergreen)	Barrels	Sharp freezing		800,000 of peas; 360,000 of berries.	300,000 of berries.
Priebe & Sons, Inc Chicago, Ill.		Poultry (fully dressed)					
Progress Packing Co Chambersburg, Pa.	Chambersburg, Pa.	Poultry (full drawn)	Birds wrapped in transparent cellulose.	Cridericed process; brine at –3 to –5 deg. F. passed through tube inserted in eviscerated bird.			
W. H. Roberts & Co Baltimore, Md.	Baltimore, Md.	Strawberries, spinach					
S. K. Produce Co 565 Fulton St., Chicago, Ill.		Poultry, eggs					
Salter Canning Co North Rose, N. Y.		Red sour pitted cherries	Tins (30 lb.); barrels (450 lb.).	Sharp freezer	None	134,250	
Seymour Packing Co Topeka, Kan.		Poultry					
Sunny Brook Berry & Hop Yards Roy E. Lathrop & Sons, Grants Pass, Ore.	Grants Pass, Ore.	Blackberries (evergreen)	Barrels (50 gal.)	Sharp freezing	300,000	200,625	337,500
A. L. Stewart & Sons Cherryfield, Me.	Portland, Me.	Blueberries	Wooden boxes (30 lb.)	Sharp freezing		From 3 to 10 cars a year	
University of Tennessee, Engineering Experiment Station, Knoxville, Tenn.	Knoxville, Tenn.	Youngberries, strawberries, peaches (products are frozen for experimental purposes).	Tins (20 lb.); paper tubs (6 lb.); cartons (1, 2½, 5 lb.). Product in heat-sealed transparent cellulose bags inside cartons.	Immersion in brine or sugar solution at temperature of 3 to 5 deg. F.		116,766	350,000
Vancouver Island Cooperative Fruit Exchange, Saanichton P. O., Victoria, B. C.	Lake Hill, B. C.	Strawberries, loganberries, raspberries, gooseberries, cherries and many small fruits.	Barrels; tins (1 gal.); other containers.	Sharp freezing		160,000	
Wegner Canning Corp Sodus, N. Y.	Sodus, N. Y.	Montmorency cherries	Tins (10, 15, 30 lb.) barrels (450 lb.).	Subzero temperatures in cold storage plant.			
Wisconsin Fishing Co Green Bay, Wis.	Green Bay, Wis.	Fish	Boxes, cartons and bulk	Ice and salt		500,000	500,000
Zeropack Co Second & Race Sts., Cincinnati, Ohio.	Main plant at Winchester, Va.	Apples, peaches, cherries, huckleberries and other fruits.	Cans (30 lb.)				

[1] Intended production. [2] Freezes food for packers but does not pack for freezing.

Frozen Foods Directory

Addendum to FROZEN FOODS DIRECTORY

(Companies included in this list are reported to be freezing food, but they have been omitted from main list because of absence of detailed information on their operations)

J. Adams & Co.,
Boston Fish Pier, Boston, Mass.

Alaskan Frozen Products, Inc.,
67 Washington Ave., Brooklyn, N. Y.

Alton Canning Co., Inc.,
Alton, N. Y.

American Packing Co.,
Everett, Wash.

Arnold & Winsor,
Fish Pier, Boston, Mass.

Associated Berry Growers' Cooperative Association,
Hatzic, B. C., Canada.

Atlantic & Pacific Fish Co.,
Boston Fish Pier, Boston, Mass.

Banks Berry Growers Assn.,
Banks, Ore.

Barnes & Fischer,
Sodus, N. Y.

Berry Growers' Packing Co.,
Gresham, Ore.

Biggar's Fresh Frozen Fruits,
Fruitland, Ont., Canada.

Boston Fish Co.,
Fish Pier, Boston, Mass.

Brakeley Canning Co.
Bordentown, N. J.

Howard T. Burge Co.,
1807 E. Olympic Blvd., Los Angeles, Calif.

John Burns Co.,
Fish Pier, Boston, Mass.

Busalacchi Bros.,
Fish Pier, Boston, Mass.

Catchpole Bros.,
North Rose, N. Y.

Central Kitsap Fruit Growers Assn.,
Port Orchard, Wash.

C. & H. Packing Co.,
Everett, Wash.

F. W. Chamberlain,
Toledo, Ohio.

W. N. Clark Co.,
Rochester, N. Y.
(Freezing in experimental quantities)

Cleary Packing Co, Inc.,
Everett, Wash.

Cloverdale-Lewis River Cooperative Berry Growers' Association,
Kalama, Wash.

Copeland & Wilson,
310 N. W. Hoyt St., Portland, Me.

Copper County Cooperative Industries, Inc.,
Hancock, Mich.

Crown Fruit & Extract Co.,
Watsonville, Calif.

Diana Fruit Preserving Co.,
Santa Clara, Calif.

Door County Fruit Growers' Union,
Sturgeon Bay, Wis.

Eastern Seafood Co.,
Fish Pier, Boston, Mass.

Elberta Packing Co.,
Elberta, Mich.

Elmhurst Packers, Inc.,
801 98th Ave., Oakland, Calif. (Freezing mostly experimental)

L. J. Esses,
Montesano, Wash.

Evergreen Fruit Growers' Association,
Everett, Wash.

Fanning Bread & Butter Pickle Co.,
Norfolk, Va.

Fassett & Co.,
Tacoma, Wash.
(Freeze for own use only)

Field Packing Co.,
Owensboro, Ky.

Frozen Fruit Co.,
Mart Bldg., St. Louis, Mo.

Fulham & Herbert,
Fish Pier, Boston, Mass.

Golden State Meat Co.,
Los Angeles, Calif.

L. B. Goodspeed, Inc.,
Fish Pier, Boston, Mass.

Grand Mound Fruit Growers Cooperative Assn.,
Grand Mound, Wash.

Gray Manufacturing Co.,
1102 Ide St., Spokane, Wash.

Grays Harbor Berry Growers Assn.,
Elma, Wash.

Growers' & Packers' Coop. Canning Co.,
North Collins, N. Y.

Gulf Stream Fish Co.,
Fish Pier, Boston, Mass.

Gypsum Canning,
Port Clinton, Ohio.

Hammond Packing Co.,
Hammond, La.

Harrington & Co.,
Dushore, Pa.

Harvey & Co.,
St. Johns, N. F.

Haskins Fish Co.,
Fish Pier, Boston, Mass.

Heeney Bros., Ltd.,
Terminal Warehouse, Toronto, Ont., Canada.

Helen Packing Corp.,
North Collins, N. Y.

H. C. Hemingway & Co.,
Syracuse, N. Y.

Henry & Close Co.,
Fish Pier, Boston, Mass.

Herman Fruit & Vegetable Co.,
856 Portland Ave., Rochester, N. Y.

Hill Packing Co.,
Topeka, Kansas

E. B. Holton,
Webster, N. Y.

House of David Cold Storage Plant,
1104 Broad St., St. Joseph, Mich.

Huber Packing Co.,
Olympia, Wash.

Independent Ice & Cold Storage Co.,
Shreveport, La.

Indian River Fisheries,
Sebastian, Fla.

Jory Packing Co.,
Salem, Ore.

Kerr Conserving Co.,
1835 S. E. 10th Ave., Portland, Ore.

Kadota Fig Gardens, Erb.,
Waterford, Calif.

Kuner Empson,
Brighton, Col.

Wm. Kuster,
Modesto, Calif.

MacKinnon Canning Co.,
Eburne, B. C., Canada

W. E. Malcolm,
Wauchula, Fla.

John Mantia & Sons Co., Inc.,
Fish Pier, Boston, Mass.

Marlene Fish Co.,
Ketchikan, Alaska.

Massachusetts Fish & Ice Co.,
Boston, Mass.

Massachusetts Ice & Cold Storage Co.,
Boston, Mass.

S. P. Matheny,
Sublimity, Ore.

L. C. Mays Co.,
423 Gravier St., New Orleans, La.

Wm. W. McBride Co.,
Lowman Bldg., Seattle, Wash.

Medomak Packing Co.,
Winslow's Mills, Me.

Ralph Mesler & Son,
Gasport, N. Y.

W. Mills & Son,
Fish Pier, Boston, Mass.

Moll Brothers,
Ontario, N. Y.

J. C. Morgan Co.,
Traverse City, Mich.

National Dairy Products Corp.,
Tampa, Fla.

Neal Canneries, Inc.,
Hurlock, Md.

New Era Canning Co.,
New Era, Mich.

North Carolina Fisheries, Inc.,
Morehead City, N. C.

Northeast Maine Canning Co.,
Corinna, Me.

Northport Cherry Factory, Inc.,
Port Clinton, Ohio.

Northwest Evergreen Products Co.,
Seattle, Wash.

Northwest Ice & Cold Storage Co.,
Kent, Wash.

R. O'Brien & Co.,
Fish Pier, Boston, Mass.

Oceana Canning Co.,
Shelby, Mich.

Olympia Pie Co.,
Seattle, Wash.

Onekama Packing Co.,
Onekama, Mich.

Orchard Produce Co.,
3601 Wazee St., Denver, Colo.

Oregon Berry Packing Co.,
973 S. E. Union St., Portland, Ore.

Orser Packing Co.,
Cicero, New York

Oswald & Taube Co.,
34 W. 2nd St., Cincinnati, Ohio.

Pacific Bakers' Supply Co.,
2461 Enterprise St., Los Angeles, Calif.

Pacific Food Products Co.,
2040 Weller St., Seattle, Wash.

Pacific Northwest Canning Co.,
Puyallup, Wash.

Pacific Refrigeration Co.,
911 Ray Bldg., Oakland, Calif.

Palmyra Canning Co.,
334 Railroad Ave., Palmyra, N. Y.

L. V. Pease & Co.,
Coleman Bldg., Seattle, Wash.

B. F. Phillips Co.,
Fish Pier, Boston, Mass.

Pine Tree Packing Corp.,
Bangor, Me.

Portland Berry Growers Assn.,
1101 S. E. Union Ave., Portland, Ore.

Portland Fish Co.,
Portland, Me.

W. H. Pride & Co.,
Bellingham, Wash.

P. H. Prior Co.,
Fish Pier, Boston, Mass.

Producers' Cooperative Packing Co.,
Salem, Ore.

Quincy Market Cold Storage & Warehouse Co.,
178 Atlantic Ave., Boston, Mass.

Barney Radovich,
Watsonville, Calif.

Reichert & Duncan,
1008 Western Ave., Seattle, Wash.

A. F. Rich & Co.,
Fish Pier, Boston, Mass.

Richardson & Holland, Inc.,
1001 John St., Seattle, Wash.

Geo. G. Root,
Portland, Ore.

Rose Hill Packing Co.,
Kirkland, Wash.

Salem Cherry Growers' Association,
902 First St., Salem, Ore.

Seattle Ice Co.,
Seattle, Wash.

M. G. Schroder,
910 Sterling Building, Houston, Texas.

Silverton Food Products Co.,
Silverton, Ore.

Sky Bros.,
Altoona, Pa.

A. P. Slade & Co.,
Vancouver, B. C., Canada

Snohomish County Berry Growers Assn.,
Marysville, Wash.

Southern California Youngberry Growers' Assn.
1807 E. Olympic Blvd., Los Angeles, Calif.

Southern United Ice Co.,
Hammond, La.

Spencer Packing Co.,
Lebanon, Ore.

Spokane Street Cold Storage Plant,
Seattle, Wash.

Stratton Fruit Corp.,
Orem, Utah

Tacoma Ice & Cold Storage Co.,
Tacoma, Wash.

Tampa Union Terminal, Inc.,
Tampa, Florida.

Tawes Ice Co.,
Crisfield, Md.

Tea Garden Products Co.,
3433 Airport Way, Seattle, Wash.
(Freezes for own use only.)

J. G. Townsend & Co.,
Shelbyville, Del.

Twentieth Century Frosted Foods Corp.,
San Antonio, Texas.

United Farmers Cooperative Fruit & Produce Exchange.
Hatzic, B. C., Canada.

Upton Produce Co.,
Norfolk, Va.

Utah Coldpack Fruit Corp.,
Orem, Utah

Valley Canning Co.,
Carnation, Wash.

Victor Preserving Co.,
Ontario, N. Y.

C. W. Wacker,
419 S. 12th Blvd., St. Louis, Mo

Ward Ice Industries,
Fort Smith, Ark.

Waynesboro Ice & Cold Storage Co.,
Waynesboro, Pa.

G. L. Webster Co, Inc,
Cheriton, Va.

W. E. A. Wellbacher,
1327 Palmetto St., Los Angeles, Calif.

Wessel Duval & Co., Inc.,
90 Broad St., New York, N. Y.

Western Oregon Packing Corp.,
Corvallis, Ore.

White River Berry Growers Assn.,
Kent, Wash.

Warren Wiley,
Kent, Wash.

A. B. Williams Fruit Co.,
Sodus, N. Y.

H. A. Wilson Co.,
Portland, Me.

Winlaw Farmers Institute,
Winlaw, B. C., Canada.

Winslow Berry Growers Assn.,
Winslow, Bainbridge Island, Wash.

Wood Grocery Co.,
Dillon, N. C.

George Worten,
Port Orchard, Wash.

J. G. Wright Inc.,
Wilson, N. Y.

Yorkstate Food Products Co.,
95 Comstock Ave., Buffalo, N. Y.

FROZEN EGGS DIRECTORY

(Inasmuch as frozen eggs do not enter into competition with other frozen foods, but represent a specialized type of product, sold principally to bakers, companies which freeze only eggs are listed here separately from the main Frozen Foods Directory.)

Albert & Gerber,
315 Greenwich St., New York, N. Y.

American Egg & Products Co.,
12 Ashley St., St. Louis, Mo.

Amos-Bird Co.,
350 Madison Ave., New York, N. Y.

Armour & Co.,
Union Stock Yards, Chicago, Ill.

Beatrice Creamery Co.,
1526 S. State St., Chicago, Ill.

S. Blick Co.,
346 Greenwich St., New York, N. Y.

Bowman & Co., Inc.,
110 N. Franklin St., Chicago, Ill.

B. P. Brown,
3147 Larimore St., Denver, Colo.

M. Brown & Sons, Inc.,
80 S. Market St., Boston, Mass.

Joseph Buchwald & Co.,
855 McAllister St., San Francisco, Calif.

J. W. Buffington Co.
1000-02 Hillen St., Baltimore, Md.

Dave Bunshaft,
238 Elk St., Buffalo, N. Y.

Commercial Creamery Co.,
S. 1593 Cedar St., Spokane, Wash.

Consumer Sanitary Coffee & Butter Stores,
8235 Vincennes Ave., Chicago, Ill.

Desel-Boettcher Co.,
901 Commerce St., Houston, Texas.

Domestic Egg Products Co.,
Chickasha, Okla.

Fairfax Parson Packing Co.,
418 Third Ave., N., Minneapolis, Minn.

Fairmont Creamery Co.,
Omaha, Neb.

Fort Worth Poultry & Egg Co., Inc.,
701 E. 9th St., Fort Worth, Texas.

Peter Fox Sons Co.,
1122 Fulton Market, Chicago, Ill.

Morris Frank,
337 S. Front St., Philadelphia, Pa.

Frigid Foods Products Co.,
1951 E. Ferry Ave., Detroit, Mich.

W. F. Gravins & Co., Inc.,
23 S. 13th St., Richmond, Va.

The Great Atlantic & Pacific Tea Co.,
Cranston, R. I.

Greenlee Products Co.,
Lewis and O'Fallon Sts., St. Louis, Mo.

J. S. Griffiths Co.,
1312 Western Ave., Seattle, Wash.

Gross Egg Co.,
345 N. Canal St., Chicago, Ill.

Hanna Poultry & Egg Co.,
Atchison, Kan.

Henderson Produce Co.,
Monroe City, Mo.

Herndon Produce Co.,
2116 Canton St., Dallas, Texas.

Independence Product Co.,
Independence, Iowa.

Iowa City Poultry & Egg Co.,
Iowa City, Iowa.

Jerpe Commission Co., Inc.,
Omaha, Neb.

Louis Kalb,
361 Greenwich St., New York, N. Y.

Kalin Bros. & Co., Inc.,
931 Mateo St., Los Angeles, Calif.

Koster Butter & Egg Co.,
34 Gansevoort St., New York, N. Y.

Land O'Lakes Creamery, Inc.,
Minneapolis, Minn.

Lawrence Poultry & Egg Co.,
Lawrence, Kan.

Lewiston Bakery,
Lewiston, Idaho.

Litchfield Produce Co.,
Litchfield, Minn.

Lubbock Poultry & Egg Co.,
Lubbock, Texas.

Lucerne Cream & Butter Co.,
Los Angeles, Calif.

Manhattan Egg Co., Inc.,
349 Greenwich St., New York, N. Y.

Mars, Inc.,
2019 N. Oak Park Ave., Chicago, Ill.

Marsh & Marsh,
Omaha, Neb.

Marshall Kirby & Co.,
525 S. First St., Terre Haute, Ind.

Meridian Produce Co.,
Meridian, Idaho.

L. Meyer & Co., Inc.,
54 Newark Ave., Jersey City, N. J.

Modern Food Co.,
Arcade Station, Los Angeles, Calif.

John Morrell & Co.,
Ottumwa, Iowa.

M. D. Musser,
2225 N. Tacoma Ave., Tacoma, Wash.

Mutual Creamery Co.,
551 West 3rd St. S., Salt Lake City, Utah.

National Dairy Products Co.,
New York, N. Y.

Nelson Ricks Creamery Co.,
314 W. 3rd St., Salt Lake City, Utah.

Nevada Poultry Producers, Inc.,
Reno, Nev.

H. M. Noack & Sons,
Arlington, Minn.

Charles H. Nolte, Inc.,
501 W. 16th St., New York, N. Y.

North American Creamery Co.,
Oakes, N. D.

Northern Creamery,
Great Falls, Mont.

Omaha Cold Storage Co.,
Omaha, Neb.

Jacob Orringer,
1217 Colwell St., Pittsburgh, Pa.

Ovson Egg Co.,
308 W. Washington St., Chicago, Ill.

Pacific Commonwealth Corp.,
Newhall Building, San Francisco, Calif.

Paden Thompson Produce Co.,
Dodge City, Kan.

W. B. Parrott Co.,
Manning, Iowa.

Parsons Poultry & Egg Co.,
Parsons, Kan.

Pennington Produce Co.,
Sulphur Springs, Texas.

T. A. Petty & Son,
435 E. Jefferson St., Louisville, Ky.

Poultry Producers of Central California,
840 Battery St., San Francisco, Calif.

Poultry Producers of Northern California,
West Eureka, Calif.

Poultryman's Cooperative Association of Southern California,
1513 Mirasol St., Los Angeles, Calif.

Priebe & Sons, Inc.,
110 North Franklin St., Chicago, Ill.

Producer's Produce Co.,
Springfield, Mo.

Rhodes Ranch Egg Co.,
1525 Market St., Denver, Colo.

Rothenberg & Schneider,
30 Green St., Chicago, Ill.

L. Rudolf Co., Inc.,
141 Reed St., New York, N. Y.

S. K. Produce Co.,
565 Fulton St., Chicago, Ill.

Seymour Packing Co.,
Topeka, Kansas.

Sherman White Packing Co.,
Fort Wayne, Ind.

L. Siegal,
1304 Clark St., Pittsburgh, Pa.

Southern Wisconsin Produce Co.,
Madison, Wis.

Sommerman & Sons, Inc.,
319 N. Carpenter St., Chicago, Ill.

F. M. Stamper Co.,
Moberly, Mo.

Standard Brands, Inc.,
595 Madison Ave., New York, N. Y.

Standard Egg Co.,
2190 Folsom St., San Francisco, Calif.

Swift & Co.,
Union Stock Yards, Chicago, Ill.

A. F. T. Thidodeau Co., Inc.,
2040 Howard St., Detroit, Mich.

E. L. Thomson Co., Inc.,
1416-22 E. Eighth St., Los Angeles, Calif.

Benjamin Titman Corp.,
60 Hudson St., New York, N. Y.

Tranin Egg Products Co.,
217 Oak St., Kansas City, Mo.

Utah Poultry Producers Association,
Salt Lake City, Utah.

Vilas & Co.,
Storm Lake, Iowa.

Wadley Co.,
Indianapolis, Ind.

Washington Cooperative Egg & Poultry Association,
201 Elliott Ave., West, Seattle, Wash.

Wescott & Winks,
Sumner, Iowa.

Western Nevada Poultry Association,
Reno, Nevada.

Western Refrigerating Co.,
Petaluma, Calif.

Wilson & Co.,
Union Stock Yards, Chicago, Ill.

Wisconsin Butter & Egg Exchange,
327 E. Florida St., Milwaukee, Wis.

FROZEN FISH DIRECTORY

Cold storage warehouses in the United States and Alaska catering to the storage of fishery products, 1937.[1] Fish held in these warehouses is frozen.

Abt & Lewis, Inc.,
626 Hegney Place, New York, N. Y.

American Ice & Cold Storage Co.,
Everett, Wash.

Anchor Cold Storage Co.,
St. Louis, Mo.

Anderson Fish & Oyster Co.,
Nashville, Tenn.

Armour & Co.,
Chicago, Ill.

Ashtabula Fish Co.,
Ashtabula Harbor, Ohio.

Atlantic Coast Fisheries Corp.,
Provincetown, Mass.

Atlantic Co.,
Atlanta, Ga.

Atlantic Ice & Coal Co.,
Atlanta, Ga.

Baltimore Cold Storage Co.,
Baltimore, Md.

Bardey Packing Co.,
Astoria, Ore.

Barnegat Power & Cold Storage Co.,
Seaside Heights, N. J.

Batchelder & Snyder Co., Inc.,
55 Blackstone St., Boston, Mass.

Bay State Fishing Co.,
Vinalhaven, Me.

Beatrice Creamery Co.,
18th & Wyncoop Sts., Denver, Colo.

Block Ice & Cold Storage Co.,
Manasquan, N. J.

Booth Cold Storage Co.,
121 W. Kinzie St., Chicago, Ill.
Minneapolis, Minn.
Main & Ashley Sts., St. Louis, Mo.
St. Paul, Minn.

Booth Fisheries Corp.,
Bay City, Mich.
206 Scott St., Buffalo, N. Y.
Cleveland, Ohio.
Charlevoix, Mich.
Green Bay, Wis.
1716 Market St., Denver, Colo.
Omaha, Neb.
Seattle, Wash.
Sioux City, Iowa.

Boothbay Harbor Fish & Storage Co.,
Boothbay Harbor, Me.

Boush Ice & Cold Storage Plant,
Norfolk, Va.

Brooklyn Bridge Freezing & Cold Storage Co.,
New York, N. Y.

Buffalo Cold Storage Co.,
Buffalo, N. Y.

Canal Fish Co.,
Sandwich, Mass.

Cape Ann Cold Storage Co.,
Gloucester, Mass.

J. J. Carrigan,
N. Front St., Memphis, Tenn.

Thomas W. Carroll, Inc.,
Charleston, S. C.

Central Wharf Cold Storage Co.,
Portland, Me.

Chambersburg Ice & Cold Storage Co.,
Chambersburg, Pa.

Chemung Cold Storage Co., Inc.,
Elmira, N. Y.

Coassco Corp.,
192-204 Murray St., Newark, N. J.

Colonial Ice Co.,
P. O. Box 1088, Savannah, Ga.

Columbia River Packers Assn., Inc.,
Astoria, Ore.

Commonwealth Ice & Cold Storage Co.,
Boston, Mass.

Consolidated Cold Storage,
416-30 S. Eutaw St., Baltimore, Md.

Consumers Ice & Cold Storage Co.,
9th & C Sts., Sacramento, Calif.

Crystal Ice & Cold Storage Co.,
1620 R St., Sacramento, Calif.

Desmond Fish Co.,
Dunkirk, N. Y.

Detroit Harbor Terminals, Inc.,
W. Jefferson at foot of Clark St., Detroit, Mich.

Diamond Ice & Storage Co.,
Seattle, Wash.

Dirigo Fish Co.,
Portland, Me.

Doty Fish Co.,
Kalama, Wash.

Erie Fish Co.,
Sioux City, Iowa.
Erie, Pa.

Fairmont Creamery Co.,
Grand Island, Neb.
Green Bay, Wis.
Sioux City, Iowa.

Charles Feller, Inc.,
Marshfield, Ore.

Federal Cold Storage Co.,
Fifth & Naghten Sts., Columbus, Ohio.

Florence Fish & Oyster Co.,
206 N. Orby St., Florence, S. C.

Fulton Market Refrigerating Co.,
299 Water St., New York, N. Y.

Gorton-Pew Fisheries Co., Ltd.,
Gloucester, Mass.

Home Ice & Cold Storage Co.,
625 W. Anaheim Blvd., Long Beach, Calif.

Huron Fish Co.,
Huron, Ohio.

Hygienic Refrigerating Corp.,
Broadway & Arch Sts., Albany, N. Y.

Indiana Terminal & Refrigerating Co.,
230-248 S. Pennsylvania St., Indianapolis, Ind.

Industrial Cold Storage & Warehouse Co.,
Philadelphia, Pa.

Johnson Fish Co.,
Green Bay, Wis.

Juneau Cold Storage Co.,
Juneau, Alaska.

Ketchikan Cold Storage Co.,
Ketchikan, Alaska.

John R. Kilborn,
Cape Vincent, N. Y.

Kishman Fish Co.,
Grand River, Ohio.
Huron, Ohio.

Kolbe Fisheries Co.,
Erie, Pa.

Lackawanna Cold Storage Co.,
Scranton, Pa.

Lay Brothers,
Sandusky, Ohio.

Los Angeles Cold Storage Co.,
715 E. 4th St., Los Angeles, Calif.

Louisiana Ice & Utilities, Inc.,
Alexandria, La.

Maine Cold Storage Co.,
Bangor, Me.

Manhattan Refrigerating Co.,
New York, N. Y.

Merchants Cold Storage Co.,
Freeman, Kenyon Aves. & Barr St., Cincinnati, Ohio.

Merchants Cold Storage & Warehouse Co.,
Providence, R. I.

Merchants Ice & Cold Storage Co.,
Lombard & Battery Sts., San Francisco, Calif.
238 E. Main St., Louisville, Ky.

Merchants Refrigerating Co.,
New York, N. Y.

J. H. Michaels Co.,
Fulton Market, New York, N. Y.

Mid-Central Fish Co.,
1656 Washington St., Kansas City, Mo.

Mid-West Cold Storage Co.,
416-30 No. Broadway, Green Bay, Wis.

Minnesota Refrigerating Co.,
410-412 First St., Minneapolis, Minn.

Monmouth Beach Fish Co.,
Monmouth Beach, N. J.

Natchez Fish Co.,
107 S. Wall St., Natchez, Miss.

National Cold Storage Co., Inc.,
19 Hudson St., New York, N. Y.

National Ice & Cold Storage Co.,
Union & Battery Sts., San Francisco, Calif.
Center & Banning Sts., Los Angeles, Calif.

National Terminals Corp.,
1220 W. 9th St., Cleveland, Ohio.

New England Cold Storage Co., Inc.,
329 Commercial St., Portland, Me.

New England Fish Co.,
Vancouver, B. C., Canada.

New Orleans Cold Storage Warehouse Co., Ltd.,
New Orleans, La.

Newport News Refrigerating Plant,
Newport News, Va.

North Truro Cold Storage Co.,
North Truro, Mass.

Northern Cold Storage & Warehouse Co.,
7th Ave. West & Railroad St., Duluth, Minn.

Northwestern Ice & Cold Storage Co.,
Portland, Ore.

Ocean Fish Co.,
San Pedro, Calif.

Omaha Cold Storage Co.,
Omaha, Neb.

Frank C. Pearce Co.,
Gloucester, Mass.

Pennsylvania Ice Mfg. & Coal Co.,
New York & Spruce Aves., N. Wildwood, N. J.

Peoria Service Co.,
920 S. Washington St., Peoria, Ill.

Petersburg Cold Storage Co.,
Petersburg, Alaska.

E. J. Platte Fisheries,
Vicksburg, Miss.

Port Clyde Fish & Cold Storage Co.,
Port Clyde, Me.

Port of Seattle,
Seattle, Wash.

Portland Fish Co.,
Portland, Me.
Portland, Ore.

Post Fish Co.,
Sandusky, Ohio.

Producers Fish Co.,
Grand River, Ohio.

Provincetown Cold Storage Co.,
Provincetown, Mass.

Quaker City Cold Storage Co.,
Delaware Ave. & Spruce Sts., Philadelphia, Pa.

Quincy Market Cold Storage & Warehouse Co.,
178 Atlantic Ave., Boston, Mass.

St. Louis Refrigerating & Cold Storage Co.,
St. Louis, Mo.

San Juan Fishing & Packing Co.,
Seattle, Wash.

Schacht Fish Co.,
Sandusky, Ohio.

Frank G. Schilling Co.,
Green Bay, Wis.

Sheriff Street Market & Storage Co.,
Cleveland, Ohio.

Simmesport Fish Co.,
Simmesport, La.

Sitka Cold Storage Co.,
Sitka, Alaska.

S. Sklaroff & Sons,
Philadelphia, Pa.

Standard Ice Co.,
Pittsburgh, Pa.

Swift & Co.,
Saginaw, Mich.

Tacoma Ice & Cold Storage Co.,
2601 Holgate St., Tacoma, Wash.

Terminal Refrigeration & Warehouse Co.,
4½ & D Sts., S. W., Washington, D. C.

Terminal Warehouse Co.,
27th St. & 11th Ave., New York City.

C. Tuttle & Sons,
Suamico, Wis.

Union Fishermans Cooperative Packing Co.,
Astoria, Ore.

Union Ice & Storage Co.,
Wilmington, Calif.

Union Storage Company of Erie,
15th & German Sts., Erie, Pa.

United Fisheries Co.,
Sandusky, Ohio.

Vermilion Fisheries Co.,
Vermilion, Ohio.

Virginia Ice & Freezing Corp.,
Norfolk, Va.

Vita Food Products, Inc.,
644 Greenwich St., New York, N. Y.

Wadley Co.,
301-311 South First St., Terre Haute, Ind.

Washington Cold Storage Co., Inc.,
2000 Railroad Ave., Seattle, Wash.

West Farms Cold Storage Co., Inc.,
435 Devoe Ave., New York, N. Y.

Western Refrigerating Co.,
20 E. Austin Ave., Chicago, Ill.

Wisconsin Fishing Co.,
Green Bay, Wis.

Yorktown Ice & Storage Corp.,
Yorktown, Pa.

[1] Firms reporting cold storage holdings of fish to the Bureau of Agricultural Economics, U. S. Department of Agriculture.

Packaging frozen foods is a special problem. It requires special wrapping papers. One of the important requirements is that the wrapper will *keep its strength when wet.* That's a big point about Patapar. It is insoluble! It will withstand moisture and frost. Also it is pure and non-toxic, and has no influence on the taste or odor of the food.

May we send you samples and further information about Patapar? When writing, kindly mention the nature of your pack.

Paterson Parchment Paper Company
Bristol, Pennsylvania

West Coast Plant: 340 Bryant Street, San Francisco, California
Branch Offices: 111 West Washington Street, Chicago, Ill. • 120 Broadway, New York, N. Y.

Patapar Vegetable Parchment

INSOLUBLE • GREASE-PROOF • ODORLESS

Flat BAGS

Square BAGS

Cellophane or Parchment

DESIGNED AND BUILT FOR LOW TEMPERATURES

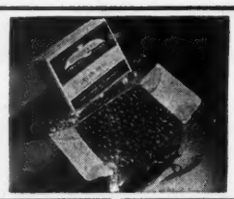
Write for Samples

THOMAS M ROYAL & CO

PHILADELPHIA U S A

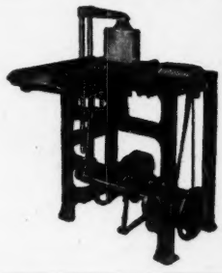
peters packaging machines to set up and close

FROZEN FOODS CARTONS



Birds Eye and many others have found the Peters Style carton to be the best package for Frozen Foods.

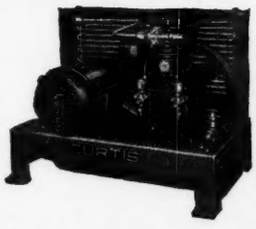
This PETERS JUNIOR CARTON FORMING AND LINING MACHINE sets up 30-40 frozen foods Peters Style cartons per minute, requiring only one operator. It can be made adjustable for many sizes. Machines also available to automatically set up and close up to 60 cartons per minute, requiring no operator.



Ask us to send you complete information on machines to handle your cartons economically and efficiently.

PETERS MACHINERY COMPANY
4700 RAVENSWOOD AVENUE
CHICAGO . . . . . ILLINOIS
BRAMIGK & CO., LTD. . . . LONDON, ENGLAND

Cut Cost of Frozen Foods with CURTIS Condensing Units



● You'll get accurate, dependable, care-free performance from Curtis compressors and condensing units, the most important part of your air conditioning or refrigeration installation. Curtis leadership is apparent in every engineering detail, in attractiveness of design, in the silent, vibrationless operation and economical performance of every Curtis unit—proven in the thousands of systems now in service throughout the world.

Avoid costly breakdowns and service calls—choose Curtis for highest efficiency and low operating cost. There's a Curtis model to exactly balance YOUR air conditioning or refrigeration requirements.

Call or Write Your Nearest Curtis Representative for Complete Information

CURTIS REFRIGERATING MACHINE CO.

1992 Kienlen Avenue St. Louis, U.S.A.

"Builders of Condensing Units Since 1922"

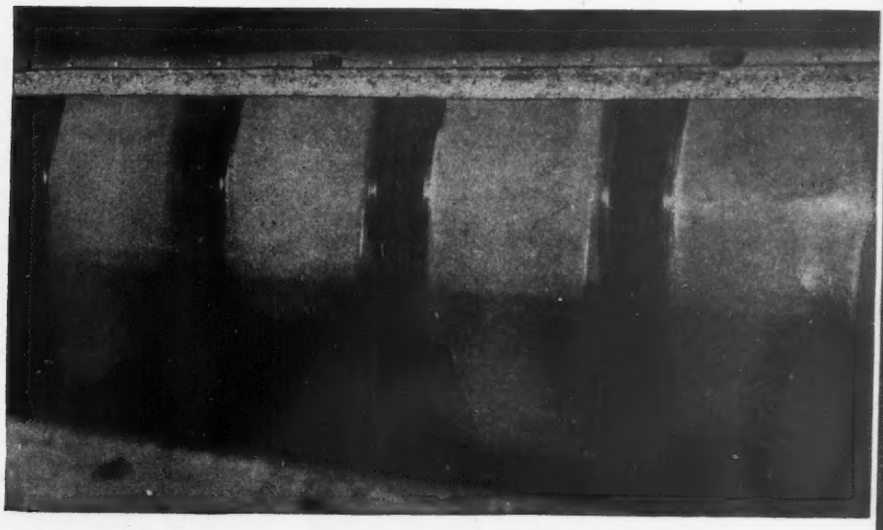
CURTIS
REFRIGERATION
AIR CONDITIONING AND COMMERCIAL

FLAKICE
TRADE MARK

FROZEN WATER RIBBONS

ALL BY ITSELF this machine makes FLAKICE FROZEN WATER RIBBONS. Normally 100 lbs. of them can be substituted for about 133 lbs. of block ice that is crushed before using. Machines are of rugged construction. Maintenance is low and no attendant is necessary. Units available to deliver from 5 to 25 tons per 24-hour day.

STORED WITHOUT REGEALING and with practically no loss. No razor-sharp edges. Ideal for lowering temperature of foods and other materials that are "batch-mixed" in agitators. For reducing friction when "chopping" (meat for instance). To hold, pack, or transport milk, and other perishable foods.



ICE IN 60 SECONDS. Just press a switch—the cylinder revolves in a tank of pure fresh water, and as it rotates, the water is converted into curved, sub-cooled, ⅛ inch thick FLAKICE FROZEN WATER RIBBONS which automatically peel from the Monel Metal surface.

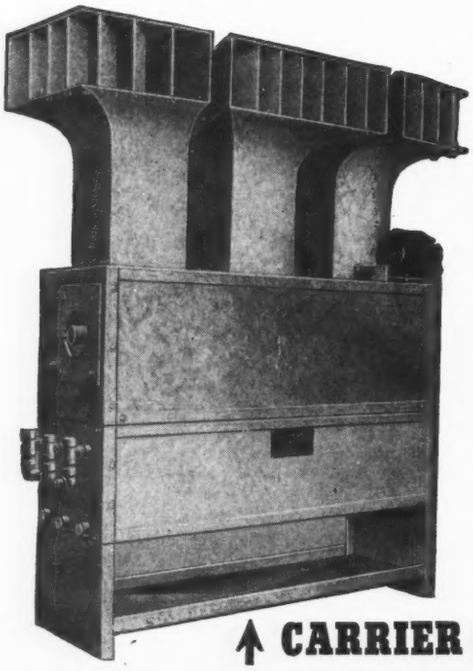
WRITE NOW, addressing Desk L at "Headquarters." Or look in the classified section of your 'phone book for the York Branch nearest you. Ask, too, about other York equipment for refrigeration and air conditioning work in your plant. York Ice Machinery Corporation, York, Pennsylvania. Headquarters branches throughout the world.

YORK *Headquarters for Mechanical Cooling since 1885*

REFRIGERATION (york) AIR CONDITIONING

FROZEN FOODS?

Now You can Produce Them Easier and Sell them Faster!



Carrier
AIR CONDITIONED
Refrigeration

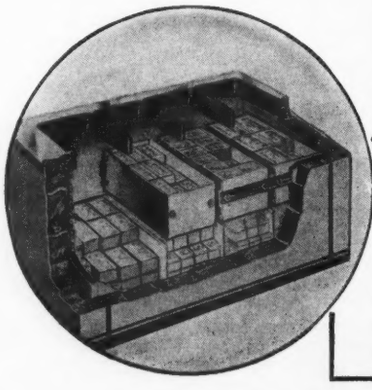
1. FAST FREEZING of foods is easily accomplished with the Carrier Cold Diffuser. Air from the room is drawn through the base, chilled with Freon, Methyl Chloride, Brine or Ammonia, then forced by multi-blade centrifugal fans to every part of storage space. Simple to install, economical, compact. In sizes from 1 to 30 tons.

↑ CARRIER COLD DIFFUSER

CARRIER FROSTED FOOD CABINET

2. FAST SELLING of frosted foods! The Carrier Frosted Food Cabinet is more than a cabinet to keep your foods at proper temperature—it's a powerful silent salesman! The lighted menu board attracts customers. The convenient interior arrangement saves time—makes selection of foods simple. Carrier construction assures durability and reduces operating costs. Available in large and small size.

3. CUT-AWAY VIEW of interior shows two important features of Carrier Frosted Food Cabinet. First, 4-inch, pure cork insulation sealed by hydrolene on all sides and bottom. Second, Carrier Trayveyor to assure more economical use, and faster service.



48 Years of Refrigeration Experience Enable Carrier to Solve Problems of Frozen Foods Industry

• Out in South Bend, Washington, the Glacier Bay Oyster Company packs thousands of gallons of oysters in paper cups for "off-season" use—and packs them faster and at lower cost with Carrier Cold Diffusers. In Wolcott, N. Y., the Wolcott Storage & Ice Company uses the same method to freeze peas, cherries, string beans and other vegetables—and again the result is saving in time and saving in refrigeration cost. Throughout the country, packers are finding that low temperature through Carrier Cold Diffusion is the answer to the frozen food problem.

Now Carrier brings the same efficiency and economy to the distribution of frozen foods—with the new Carrier Frosted Food Cabinet. Study this new Carrier development, and you'll see why it's sure to mean even greater sales and profits for the frozen food industry.

Data sheets giving complete information about Carrier Air Conditioned Refrigeration are now ready for distribution. Mail coupon today—or call your local Carrier representative.

GET THE COLD FACTS TODAY!

CARRIER CORPORATION, Desk 406
Syracuse, N. Y.

Without obligation, send me Carrier Data Sheets on ☐ Carrier Cold Diffusers; ☐ Carrier Frosted Food Cabinets; ☐ Carrier Refrigerating Machines.

Name.....

Company.....

Address.....

City.....

WHERE TO STORE FROZEN FOODS

Continued on pages 256 and 257

Storage Space for ALL KINDS of Perishable Food Commodities

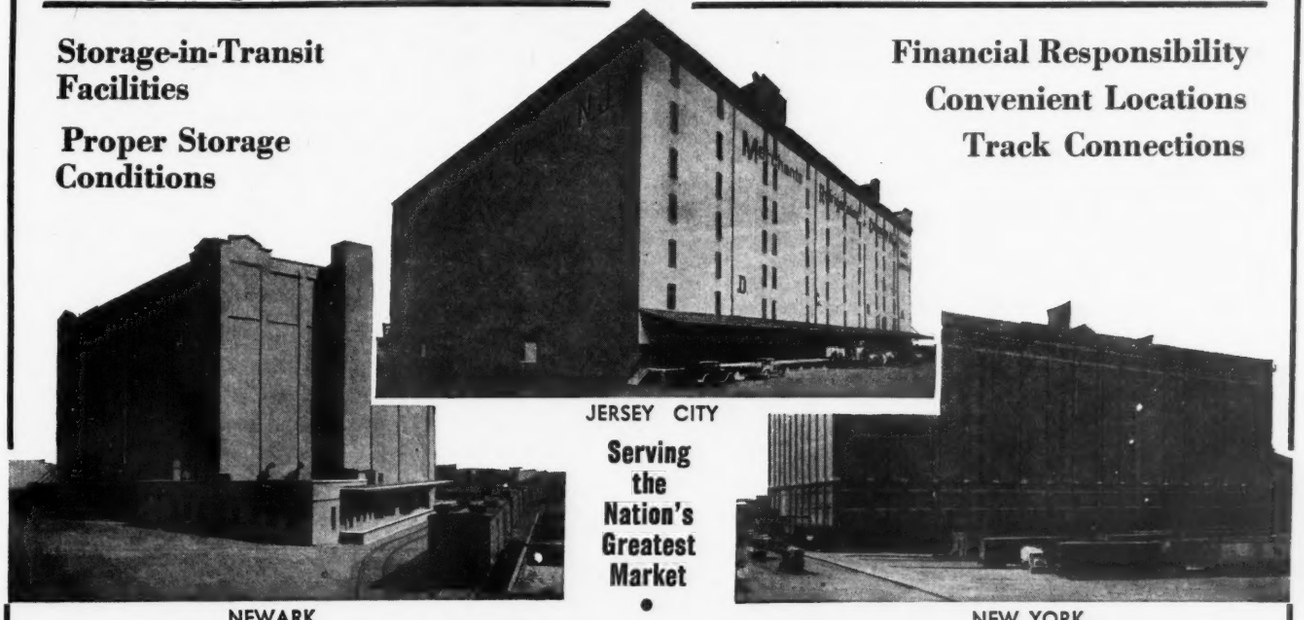
Storage-in-Transit Facilities

Proper Storage Conditions

Financial Responsibility

Convenient Locations

Track Connections



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NEWARK

NEW YORK

Serving the Nation's Greatest Market

Superior Storage Under Competent Management

Merchants Refrigerating Company

General Offices: 17 Varick St. *Warehouses:* New York, Newark, Jersey City

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THE NATIONAL COLD STORAGE CO., INC.

Refrigerated Warehousing Facilities for All Perishable

FROZEN FOOD STOCKS

New York City Area Distribution Made Convenient by Using Our

BROOKLYN and JERSEY CITY WAREHOUSES

General Offices

19 Hudson Street, New York, N. Y. Walker 5-6743

BRONX REFRIGERATING COMPANY

520-536 Westchester Avenue, New York City

Capacity 1500 Carloads

Dry and Refrigerated Storage
Separate Buildings

Territory, N. Y. City, Westchester, Brooklyn and Queens
Motor Truck Service N. Y. Central Siding
Established 1907

UNION STORAGE & TRANSFER CO.

FARGO, N. DAK.

257,780 cubic feet of refrigerated space. Temperatures plus 45 to minus 15. 1,000,000 population in this trade area. Also merchandise storage and services.

QUAKER CITY COLD STORAGE CO.

PHILADELPHIA, PA.
3 WAREHOUSES 3

Proper Temperatures For Frozen Foods

WHERE TO STORE FROZEN FOODS

Continued from page 255

Complete

COLD STORAGE SERVICE

FOR THE

Frozen Food Industry

FEDERAL COLD STORAGE CO.
PITTSBURGH, PA.

FEDERAL COLD STORAGE CO.
CLEVELAND, OHIO

FEDERAL COLD STORAGE CO.
COLUMBUS, OHIO

FEDERAL COLD STORAGE CO.
ST. LOUIS, MO.

TULSA COLD STORAGE CO.
TULSA, OKLAHOMA

THE CITY ICE AND FUEL CO.
HORNELL, N. Y.

SEABOARD TERMINAL & REFRIGERATION CO.
JERSEY CITY, N. J.

Address any of our Plants direct.

SUBSIDIARIES OF:

The CITY ICE & FUEL Company

GENERAL OFFICES CLEVELAND, OHIO

ONE of the most critical phases in the production and distribution of frozen foods is the period during which they are kept in Cold Storage.

It is essential that companies now producing or planning to produce frozen foods should be informed regarding efficient and reliable storage facilities in locations most convenient for their purposes.

This Directory is offered as a guide to such facilities—offered by companies all experienced in the proper handling and storing of all types of frozen foods. They will gladly supply information or advice on any storage problems which may be facing you.

CENTRAL
COLD STORAGE CO.
350 N. Dearborn Street,
CHICAGO, ILL.

Pioneers in low temperature storage rooms and specializing in the handling of frozen fruits and vegetables.

Let us serve you

STORE WITH US

Modern sprinklered plant with private siding, located on main line of New Haven Railroad.

Storage-in-Transit rates from the West or elsewhere to all Eastern cities.

Equipped with adequate York compressors including stand-bys.

CLINTONDALE FRUIT GROWERS CO-OP., Inc.
CLINTONDALE, N. Y.

Freezers—GREAT LAKES—Coolers

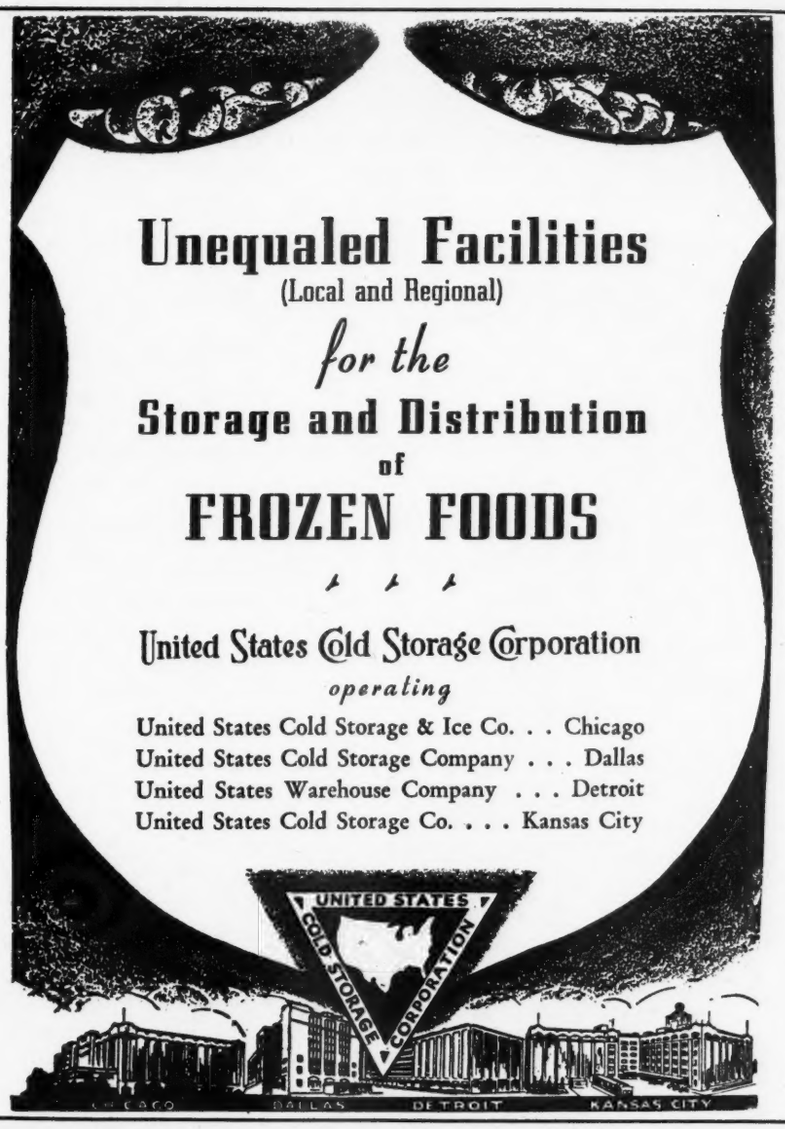
Largest up-to-date warehouse serving Toledo, Northwestern Ohio, Indiana and Michigan. Storage-in-Transit. Private sidings NYC and B&O RR's. Complete General Merchandise and Cold Storage facilities. Individual Freezer Lockers.

GREAT LAKES TERMINAL WAREHOUSE CO.
321-359 Morris Street TOLEDO, OHIO

Binghamton Refrigerating Co., Inc.
ICE AND COLD STORAGE
280 Water St., Binghamton, N. Y.
Storage in Transit on Frozen Foods
Best Distribution Point of the East

THE WISCONSIN COLD STORAGE CO.
344 East Florida Street
MILWAUKEE, WISCONSIN
HEADQUARTERS FOR
FROZEN FRUITS, VEGETABLES AND FISH

WHERE TO STORE FROZEN FOODS



Save Time and Money
Store In ERIE, PA.

Eliminate costly trucking.

Have the advantage of spot delivery at less than your present cost.

Storage in Transit. Stop over cars. Pool Car Distribution.

Private Siding—N.Y.C.R.R. Free switching three other lines. Insurance only 10¢ per $100. per year.

Write for further information.

UNION STORAGE COMPANY of ERIE
1501 German Street

TERMINAL WAREHOUSE CO.
27TH STREET & 11TH AVENUE
NEW YORK, N. Y.

First class facilities for the storage of frozen food products at low temperatures

New York Central, Erie and Lehigh Valley Railroads deliver carloads directly at warehouse door

Inquiries Solicited

WESTERN REFRIGERATING CO.
GENERAL COLD STORAGE
"Keeps them fresh"
20 E. Hubbard St. Chicago, Ill.
Phone: SUPerior 3053

AFFILIATED COLD STORAGES

IDEAL LOCATIONS **LOW FREEZER TEMPERATURES**

Chicago Cold Storage Warehouse Company
1526 South State Street
Chicago, Illinois

Detroit Refrigerating Company
2030 Howard Street
Detroit, Michigan

Lackawanna Cold Storage Company
704 Wyoming Avenue
Scranton, Pennsylvania

Wire or write any of above for information regarding our facilities

Why industry leaders specify Cellophane TRADE MARK for their frozen food packs!

"Cellophane" transparent film has what it takes to protect and sell frozen foods

1. **MOISTUREPROOF**—Prevents dehydration.

2. **AIR TIGHT**—Prevents oxidation.

3. **VERSATILE**—For the production man, it is the answer to a wide variety of food packaging problems. Just a few of the many package types in actual use are shown at left.

4. **CONSUMER ACCEPTANCE**—"Cellophane" has become a symbol for sanitation, visibility, protection and attractiveness.

Retail store selling methods are changing rapidly. New foods like these require modern sales packages.

For practical, technical assistance, without obligation, write to Product Development Section, "Cellophane" Division, E. I. du Pont de Nemours & Company, Inc., Wilmington, Del.

Cellophane TRADE MARK

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